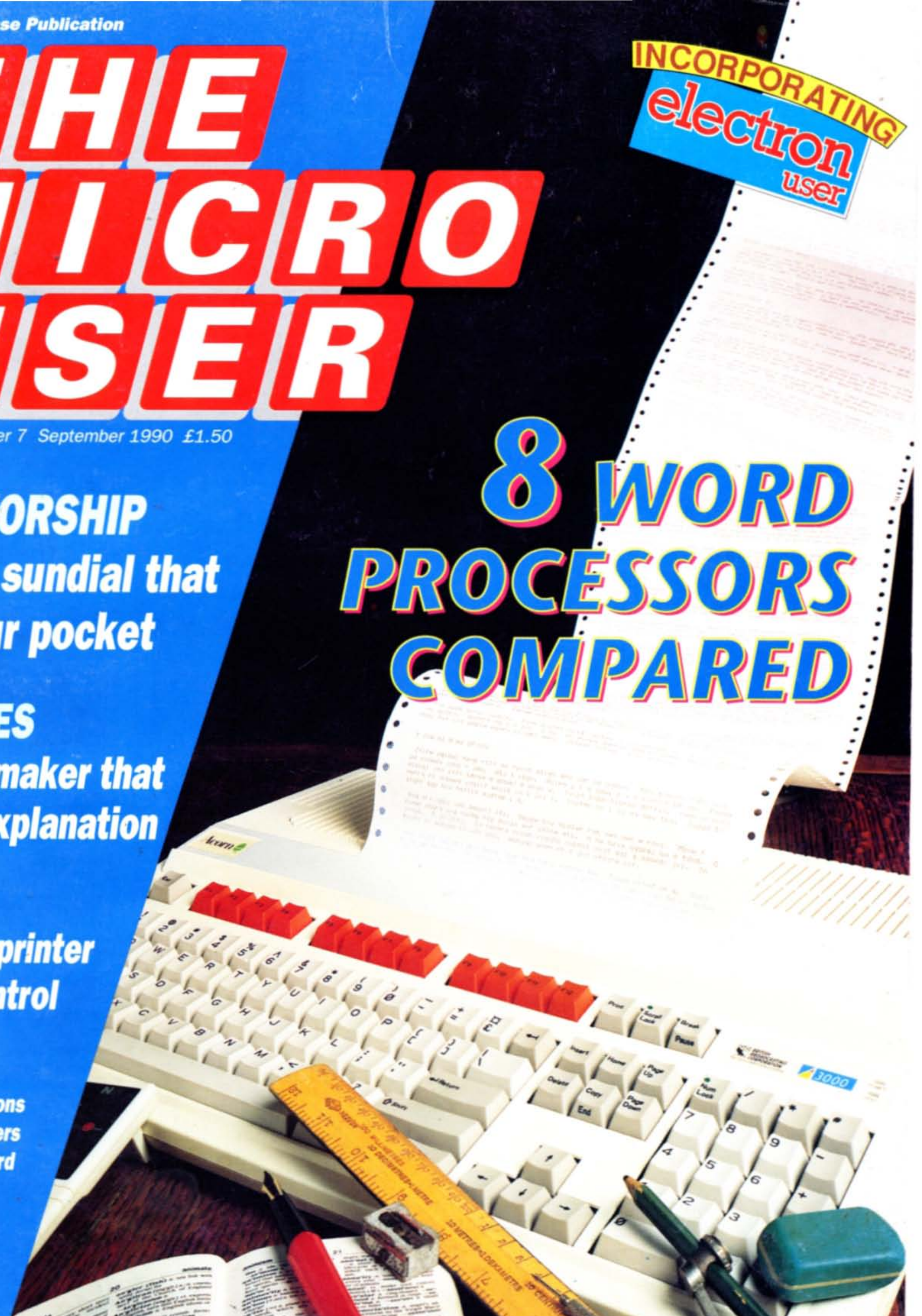
A Database Publication

THE MICRO USER

INCORPORATING electron user

Volume 8 Number 7 September 1990 £1.50



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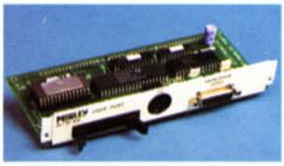

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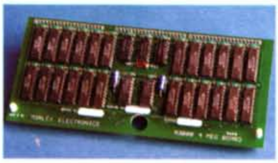

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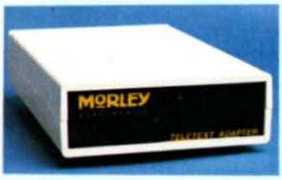

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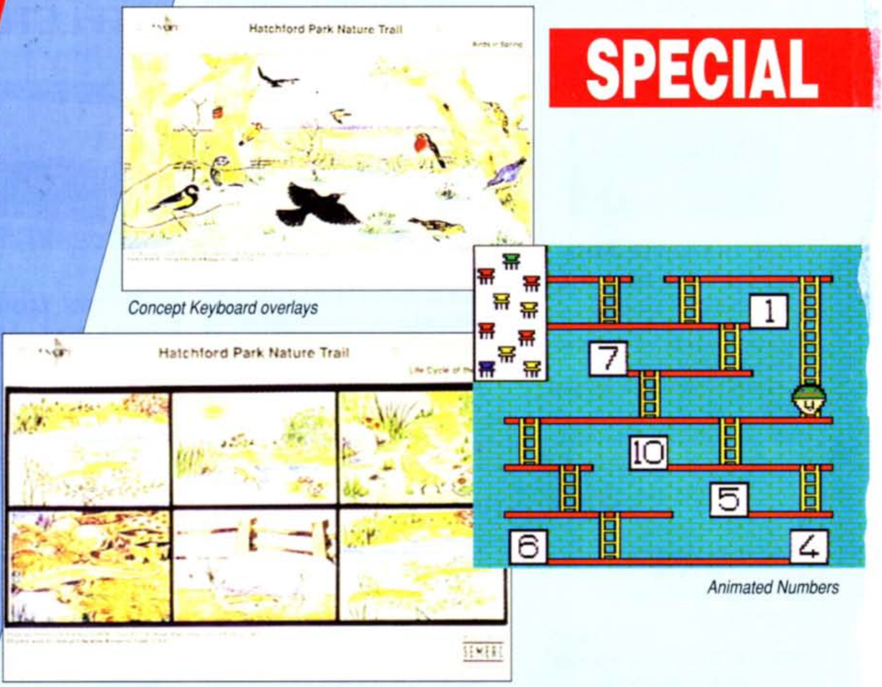

Concept Keyboard overlays

Animated Numbers

Type-it-in

This symbol indicates that the feature contains at least one full length listing for you to key in on your micro. *

Get it right ✓

All the major listings in this magazine are accompanied by checksums to help you key them in correctly. For full details of how to use them see the article on page 72 of the February issue.

MICRO USER CLASSIFIEDS

The best bargains in the world of all Acorn micros come from fellow readers of The Micro User. Turn to Page 88 to find just what you're looking for – from cheap modems to complete computer systems.

Newcomers

31 **Hardware**
After the introduction of the A3000 last year we see how Pres hardware add-ons have fared.

40 **FontFX**
Real Desktop Publishing requires many special effects which haven't been available – until now.

40 **Into Print**
Tied to a forthcoming BBC TV series, this new book will help you take the plunge into DTP.

116 **!Splice**
Create animation films composed of hand-drawn or machine-generated sprites using this utility.

116 **!DiscTree**
We try out a handy application that will help you keep your disc files tidy, accessible and secure.

118 **!Tween**
Take the role of an animator and create complete films with this excellent new piece of software.

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22 **Using Concepts**
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26 **Education Reviews**
We look at the latest software for the BBC Micro series in schools including:
- Animated Numbers
- The Blue file
- Primary Integrated Project Planner

57 **Word processing**
Moving from the 8 bit BBC Micro up to the 32 bit needn't be traumatic if the right software is there.

78 **IT policy**
Getting Information Technology used in schools isn't just owning a micro – you need plans, too.

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34 **Graphics**
Acorn's !Draw is good but to transfer graphical data to another micro you need something more.

42 **Pocket Sundial**
No, it's not the April issue – you really can put this sundial in your pocket. *

62 **Car Race**
Don your racing gear for another brill game from the maestro of graphics. *

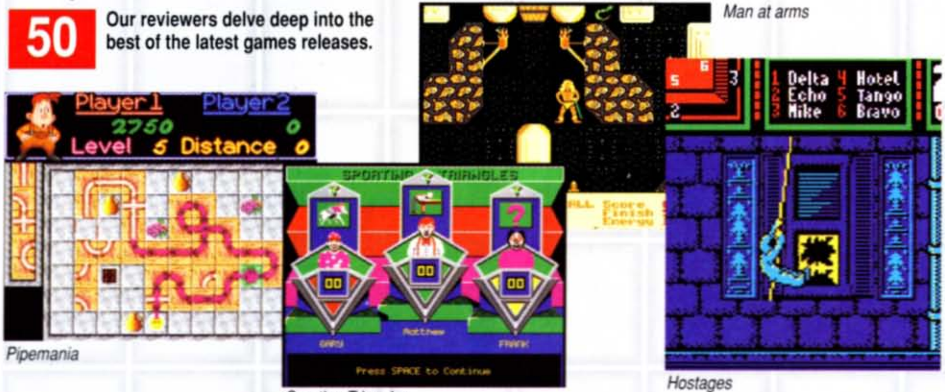
65 **Griddles**
When you thought it was safe to forget automatic graphics – here's another. *

73 **Printer Codes**
Taming that beast of a printer will never be easy, but this utility certainly helps. *

100 **Routine Matters**
A new series of useful routines for you to integrate with your own programs *

SOFTWARE SCENE

50 **Our reviewers delve deep into the best of the latest games releases.**



Man at arms

Pipemania

Sporting Triangles

Hostages

FREE Software

Subscribers to *The Micro User* will receive the following software on disc or tape wth this month's magazine:

- Pocket Sundial
- Griddles
- Print code generator
- Routine Matters

In addition, those readers with a BBC A3000 or Archimedes series machine will also receive:

- !DeskDuck
- !Sparkplug
- Bounce demo
- Fourier transform demo
- Fast Mandelbrot
- Satellite picture

There's a special gift, too, for new subscribers. If you have a BBC Micro, Electron, B+, Master or Compact you'll be sent a copy of Superior Software's amazing Exile. For BBC A3000 and Archimedes owners the gift will be the excellent 3D tank game, Conqueror.

THE MICRO USER
THE MICRO USER

Find out how to subscribe on Page 123.

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THE MICRO USER Writing programs

In our special programming issue NEXT MONTH we cover languages including C, Pascal and Basic. Not forgetting our regular features, plus the money-saving PD section.

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New Technology & CD ROM for the Archimedes

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News on the world of Archimedes
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Tutorial series for beginners
Utilities, routines and advanced programming techniques
Ready to run applications
Hardware articles
Programs and articles on sound and graphics
Postbag for your letters and answers to your questions
Hints and tips on programming
Technical queries and expert answers

The programs published in each magazine, plus additional bonus items are also available on disc.

And here are some of the articles and series you missed in the last few months:

Mastering the Wimp – series on Wimp programming
Beginning 'C' – series on the C language
Assembler Workshop – all about ARM Assembler
Under the Lid – hardware series
CD ROM for the Archimedes
Watchdog Anti-virus
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The magazine programs, plus some bonus items are also available on disc.

These are some of the items published in the last few issues:

First Course – beginners series of articles
Practical Assembler – series for Assembly language programmers
512 Forum – a series for users of the PC emulator
Edikit – a library of useful routines for Basic programmers
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Games Reviews

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News BEAT

Matchstick men show athletes the way

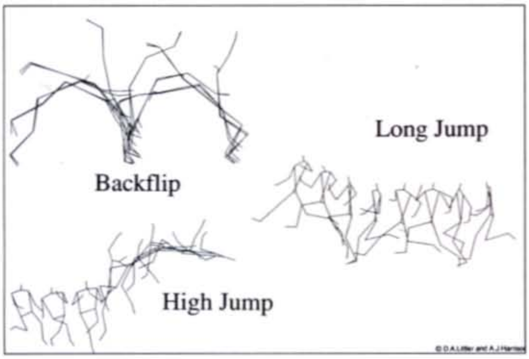
THEY no longer wear flat caps, train whippets and walk cobbled streets in Salford but a team from the city's College of Technology has brought LS Lowry's matchstick men to Archimedes screens in a major scientific breakthrough aimed at boosting the performance of British athletes.

As well as giving gold medal contenders a sporting chance, their innovation could also put hospital patients on the road to recovery after complicated surgery.

The Biomechanics Workstation teams an Archimedes computer and video camera with software developed at the college over the last two years by computer scientist Derek Littler and sport scientist Drew Harrison.

It analyses movement to show athletes how to make vital improvements to their performance when a split second or a centimetre can mean either success of failure.

Action footage is computed into matchstick figures highlighting faults which can be rectified by coaching and strengths which can be exploited. And for the medical profession, it could be an important diagnostic aid, particularly for orthopaedic patients undergoing joint replacement.



Athletics analysed

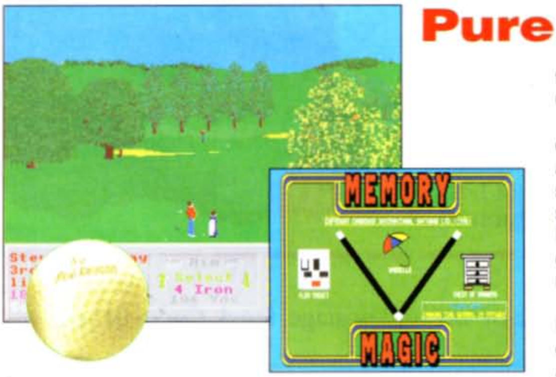
Still under development, the Biomechanics Workstation currently provides two dimensional analysis of motion but it is hoped to increase this to 3D routines. Other applications are to be targeted in the fields of both research and education. The main advantage of the new system is that it is both cheaper and more portable than its forerunners which are based on mini and mainframe computers.

Officially launched in the House of Commons, the new system has been endorsed by the world's number one junior outdoor high jumper Brendan Reilly, who told MPs and guests from the sporting and medical worlds how it had helped him better his performance and improve his techniques.

The launch was sponsored by Acorn Computers whose managing director Sam Wauchope said his company was proud to participate in such an exciting and innovative project.

"Salford has a national reputation for being a caring institution", added college principal Dr Roy Allerton. "This new scientific analysis which can be carried out quickly, cheaply and effectively will improve the quality of life for many people".

Pure memory magic...



PROGRAMMING is hard enough for the fully fit, so the latest offering from Cambridge International Software (071-833 4023) is a true testimony to the perseverence of its author, Tim Ritchins.

Tim suffers from cerebral palsy, is confined to a wheelchair and has the use of only one hand. Undaunted by his severe disability, he has produced Memory Magic, based on the old Indian game of having to memorise a number of objects seen on a dish for a short period.

"Tim had written to a number of people in the industry but was not having much luck getting work", said Mike Fowler of CIS.

"He sent me some graphics demos he had come up with and I was so impressed that I suggested visiting him at the spastic home where he lives in Exeter. Instead, he got himself on a train and came up to see us here in London.

"I gave him the idea for Memory Magic and he produced the finished game in around five months".

A staunch fan of Archimedes machines, 40–year-old Tim was given a helping hand by Acorn which provided him with a 440.

His efforts are also good news for other handicapped people. He has included features into Memory Magic specially to help disabled players, and for every copy sold, a donation will go to The Spastics Society.

Memory Magic starts by showing 4 everyday items on the screen and gets more difficult until the player has to memorise 60 items which can be seen either together or one at a time.

Available only for Archimedes machines, it costs £15.95.

Also new from CIS is MicroDrive which, Mike Fowler hastens to say, is not "just another golf game". It's a 3D golf simulation with hills behind which the ball can disapper and down which it can roll, plus trees and other obstacles the ball can hit complete with sound effects.

MicroDrive is also only available in an Archimedes version. Price, £19.95.

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But don't just take our word for it!

We are so confident that you will be impressed with Ovation that we have produced a demonstration version to enable you to evaluate it for yourself. It has most of the features of the full version allowing you to really get a feel of how easy Ovation is to use. It is even supplied with a mini manual to get you started. However, you will not be able to save your files to disc and all print-outs are marked "Demonstration."

The cost of this demonstration version is just £5.00 inclusive of postage. And if you then decide to buy Ovation, we will refund the £5.00, and you can still keep the disc.

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Telephone: 0727 40303 Fax: 0727 60263

Biggles is back

DOG fights, wizard prangs, dangerous missions or peaceful flights over the countryside are all on offer for Archimedes users with Chocks Away, the new biplane flight simulation from The 4th Dimension (0742 700661).

For one or two players, Chocks Away puts would-be pilots at the controls of a souped-up Tiger Moth.

The one player option uses the full screen and includes 20 increasingly difficult missions but novices can practise in a non-hostile environment scattered with varied scenery.

The two-player option uses a split screen for dogfights with friends or teamwork against a common foe.

Using smooth solid 3D colour graphics the game has three different maps filled with tanks, buildings, bombers, fighters, tri–planes, bridges and surprise objects.

"It allows up to five planes, including four-engined bombers to be involved in dog fights and the explosions are superb", said Steve Botterill of The 4th Dimension.

"It gets pretty hairy up there and it's totally absorbing. You can even select an outside view of your plane – which is an absolute joy to watch as you land, especially on an aircraft carrier".

White Magic

Chocks Away comes on two discs at £24.95 for Archimedes machines only.

Also new from The 4th Dimension is The Real McCoy, a compilation package featuring four top Archimedes games. These are futuristic submarine game UIM, football favourite Arcade Soccer, arcade adventure White Magic ,and Quaze.

Contained on four discs with full instructions in two manuals, The Real McCoy costs £29.95.

Turtle talk from the experts

Let's Compute cartoonist Mike Goldberg demonstrates his art to junior executives (from left to right) Matthew Steele, Janet McKnight, Kevin Childs, Tom Goldberg, Louise Davidson and Sebastian Fahey.

BOARD meetings with a difference are being held at Europa House, the headquarters of Database Publications, publishers of *The Micro User*.

Pop and crisps replace coffee and biscuits and bicycles nudge their way into the car park when the country's most junior of junior executives turn up to discuss the firm's latest venture, the world's first computer comic, Let's Compute!

As it's aimed at children, the company has turned to children to tell them what they want. Now an executive panel with an average age of 11 advises the computer boffins on cartoon characters, turtles and any other craze guaranteed to capture the imagination of their age group.

"At Database Publications we are used to producing serious computer magazines for adults, so Let's Compute! is quite a departure for us", said chairman Derek Meakin.

"Our team of resident educationalists, computer writers and cartoonists came up with the completely fresh look at teaching computing to beginners but they don't know too much about current crazes like turtles. The children have provided that valuable input – and also tell us if there are any words they don't understand".

The first issue of the new monthly is now on sale at 99p, with the second edition due shortly.

Upgrade advice at big show

A MAJOR new feature of The Computer Shopper Show at Wembley Conference Centre from December 6 to 9 will be an Acorn Conference at which end users, particularly first-time buyers and those wanting to upgrade will get expert advice on what Acorn has to offer.

With the prospect of 40,000 visitors converging on the show, the company is pulling out all the stops to persuade them to buy Acorn.

The conference will be divided into two distinct seminar programmes, one on the Thursday and Friday and one on the Saturday and Sunday.

Topics include A Vision of RISC Technology in the '90s, PC Emulation, DTP and The Potential of CD Rom.

Acorn's latest products will be put through their paces throughout the four days.

Visitors to one seminar will also be treated to a world first when Software Solutions will provide a sneak preview of Genesis 2.

As an added incentive, Acorn is working on plans to give those attending the conference discount vouchers which will be redeemable against purchases on the exhibition floor. The conference is in addition to the Acorn Village, a main feature area populated by Acorn, its supporting software and hardware developers, dealers and peripheral suppliers.

To avoid queues, visitors are invited to pre-book their tickets by ringing 051-357 1736. Admission is £5 for adults and £3.50 for children under 16, with £1 off for advance booking. A pre-paid family ticket costs £12 and covers two adults and two children. The show is open from 10am to 6pm Thursday and Friday, 9am to 6pm Saturday and 10am to 5pm Sunday. It is organised by Blenheim Database Exhibitions.

Now Loopz is moving around

AUDIOGENIC Software (081-861 1166) is currently working on Electron, BBC Micro and Archimedes conversions of the addictive Nintendo game Loopz which should be out by the end of September or early October.

Aimed at games players of all ages, Loopz involves making loopz using pieces that appear together on screen. They can be any size and shape with big ones scoring more points than small ones.

"We've been working on Loopz for a long time but for contractual reasons, we have had to keep it secret", said Audiogenic's managing director Peter Calver.

"While there are a lot of puzzle games around, only Tetris comes near to Loopz for its addictive simplicity".

Prices have not yet been fixed.

Overlays snag

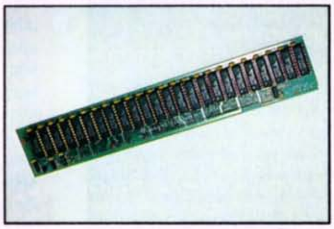
SFA Computer Supplies (041-840 1477) has had to shelve plans for its lowercase keyboard overlays (see *The Micro User*, August) because of problems in finding a suitable supplier of the bare covers.

"We have regrettably had to drop the idea of the keyboard cover at present, but fully intend to produce it when supply problems are reduced", reports Stewart Farmer of SFA.

BEEBUG The Archimedes Specialist BEEBUG

SPECIAL SUMMER PROMOTION

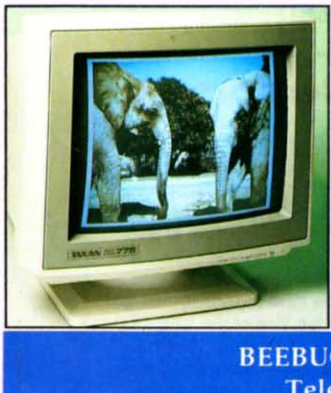
THE A3000 LEARNING CURVE



Acorn's new Learning Curve Package consists of an A3000 computer, First Word Plus V2 (the number one Word Processor package for the Arch), the PC Emulator and Genesis (A graphic based database system with a number of sample files). A parent's guide to the national curriculum and a demonstration video (VHS) is also included.

If you purchase an A3000 or Learning Curve from Beebug, in addition to the backup service for which we are renowned, we will supply free of charge an extra 1Mb RAM board, increasing the computers memory to a powerful 2Mb. For an additional £30 exc. vat we can supply and fit a MIDI/User Port expansion card normally selling for £49. This card allows external equipment to be controlled such as Concept Keyboards.

Learning Curve (no monitor)	699.00 (803.85 inc. vat)
Learning Curve (Acorn Monitor)	899.00 (1033.85 inc. vat)
A3000 (no monitor)	599.00 (688.85 inc. vat)
A3000 (Acorn Colour Monitor)	799.00 (918.85 inc. vat)



THE ARCHIMEDES 400/1 SERIES

For a limited period we are offering a number of unbeatable offers on the 400/1 series computer. It is our company policy only to supply what we believe are the best products available for the price. Our upgrades are equivelent or higher in specification to those supplied by Acorn.

OFFER 1 - £1099.00 (£1263.85 inc. VAT)

An Archimedes 410/1 upgraded with either a high quality 20Mb hard drive or a Star LC-10 Colour printer.

OFFER 2 - £1499.00 (£1723.85 inc. VAT)

An Archimedes 410/1 with a 40Mb fast (28ms) hard drive and either a free Samsung Multi-Sync Colour monitor (RRP £459) or an additional 3Mb of RAM to give the maximum 4Mb of user RAM.

OFFER 3 - £2099 (2413.85 inc. VAT) - A440/1 + £500 of free goods

A *genuine* Archimedes 440/1 with a 50Mb Hard drive (28ms access time), 4Mb of RAM and a choice of either a Taxan 775+ Multi-Sync Colour monitor or a Canon Bubblejet BJ130e printer offering near laser quality (supplied with a RISCOS printer driver).

Please add £230 (inc. vat) for an Acorn colour monitor or £493.353 for a Taxan 775+ Colour Multi-Sync if required..

Please *add £8.00 for postage & packaging per system.*
Prices & specification subject to change without notice.

BEEBUG Ltd, 117 Hatfield Road, St Albans, Herts AL1 4JS
Telephone: 0727 40303 (24 hours) Fax: 0727 60263

Police book E-Type manual

A SPOKESMAN for the Police Federation has criticised the manual which accompanies the new BBC/Electron version of top Archimedes car racing game E-Type from The 4th Dimension.

"I think this is rather irresponsible and very offensive when we are trying to build bridges with the public in general and with young people in particular", said Barrie Clarke.

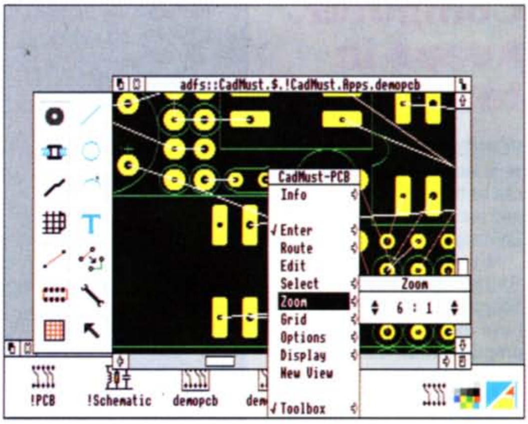
E-Type players get bonus points for putting "suicidal boys in blue" out of their misery. "It may be necessary to hit these unfortunate devils if you are to have enough time to complete the stage", says the manual.

"Once the required miles have been completed, you will no longer be given time bonuses for wanton bobby slaughter".

Mark Botterill of The 4th Dimension said: "It is more humorous than anything else.

"We thought there might have been some comments about it but no one has said anything to us. When you think about it, there are loads of games which involve police and this one is relatively mild in a fun sort of way".

Circuit designer



USARC of Amsterdam has produced a new CAD system to help electronics engineers design circuits. CadMUST is a mouse-controlled Archimedes system which incorporates schematic design with PCB software.

Current versions come complete with a set of standard libraries including TTL, CMOS, microprocessor, memory and analog devices.

However sales manager for Usarc Harn Oarlemans has revealed to *The Micro User* that their developers are currently working on a new version which will be available shortly.

"CadMUST-Schematic has been designed to offer all the functions that will ever be needed in a schematic design program", he said.

"Components can be selected from the libraries supplied with the program and can be rotated, moved, copied and repositioned as needed. Wires and buses can be set for entry at 45 or 90 degree angles.

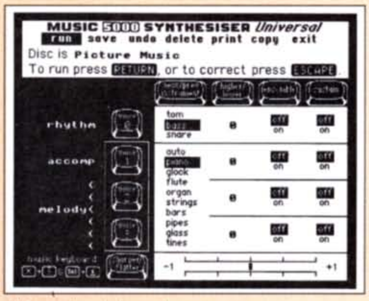
"CadMUST-PCB allows a PCB to be created by importing a netlist or through manual placement and connection of components.

"Both programs take full advantage of the Archimedes Risc processor and the Risc OS to achieve maximum performance in terms of power and speed.

"With both programs up to eight designs can be edited at any one time and each design can be simultaneously displayed in eight windows, all with different zoom rates".

Both serving a wide range of output devices, CadMUST-Schematic costs £279 and CadMUST-PCB costs £349. A combined package costs £579. Distribution arrangements are in place for the UK – further details from Usarc on 010 31 20 381534.

Beep gets a new rhythm



Disc is Picture Music
To run press RETURN, or to correct press ESCAPE.

Universal control panel

BBC Master users can now replace their machine's ordinary "beep" with the sound of digitally synthesised instruments, thanks to the long-awaited Universal software for the Music 5000 Synthesiser from Hybrid Technology (0223 420360).

It provides 16 instrument sounds which can be used in groups of up to four then enhanced with ensemble, sustain, stereo and transposition effects.

With 50 pre-set selections of popular music programs and the ability to learn, the Universal package can be used either through the computer's own speaker or other amplifiers and music centres.

The full package costs £113.85 but existing Music 5000 owners can get the Universal software alone for £33.35.

Also new from Hybrid is Soundspace, another Music 5000 add-on which allows children without formal music training to design, arrange and play sounds using just a touchscreen or joystick.

Sounds are built on screen using pre-defined sound shapes represented by coloured blocks and Soundspace also allows severely handicapped youngsters to create music using a single ability switch.

The package is for BBC B or Master 128 computers and costs £147.20. Soundspace software alone costs £33.35.

Rounding off the new releases from Hybrid is its first disc-based music album for the Music 3000 Expander, Windy Island. Written by young composer Michael Harbour, it features orchestral arrangements and detailed layers of sound and echo effects making good use of the expander's 32 sound channels. Price, £4.95.

Toshiba's Ian joins Acorn

NOW placing greater emphasis on the retail market, Acorn has created a new retail sales manager position within its structure and has given the job to former Toshiba sales manager Ian Munro.

He will be responsible for maintaining and developing the company's retail trade distribution channels. At present the company's products are available through selected Dixons, Allders and John Lewis Partnership stores. Before his job with Toshiba, Munro spent 23 years with Sony.

"Traditionally, our products have been distributed exclusively through a network of specialist computer dealers", said Acorn's general sales manager Terry Shurwood.

"The launch of the BBC A3000 and The Learning Curve however, mean that the retail marketplace is becoming increasingly important to us. Ian Munro's expertise in this area will be invaluable to future growth in this area".

New DTP Beebug package

NOW available from Beebug (0727 40303) is Ovation, a DTP system for Archimedes and A3000 machines. Strictly following Risc OS guidelines, it is an intuitive package which allows text to be typed in and loaded straight away without the need to set up styles or frames.

In addition to the usual features expected in a DTP program, Ovation offers nested frames, definable borders, line drawing, local styles and paragraph styles. It also includes full typographical control over text. Price £113.85.

Wider choice of type

FONTS from Archimedes specialist The Electronic Font Foundry (0990 28698) are being made PostScript compatible thanks to an agreement reached between EFF and Adobe.

Already, 13 fonts have been converted to Adobe specifications and the remaining EFF product list will follow suit over the next three months. A free upgrade to the new PostScript format is being offered to existing users of EFF fonts.

The EFF range includes standard business fonts through to script and cartoon typefaces plus the company's new Designer range.

They are available in families ranging from £9.95 to £33 or in packs of up to 17 fonts from £45.50 to £69.50.

Fancy dress Über alles!

Xmas is coming soon

(only 300 shopping days from today)

Hot Dogs should be eaten with mustard.

Why Trotzki would not like this font?

Rocky Horror Show

is now at Piccadilly

Electron gets Hostages

ELECTRON owners can join their BBC Micro and Archimedes counterparts to enjoy Hostages, the new release now available from Superior Software (0652 58585). Players are challenged to rescue hostages from an embassy where they are being held by a band of terrorists.

The game includes three increasingly difficult missions which must be completed to obtain passwords which lead on to higher levels.

Players completing the ultimate mission without repeating any levels are given a special message. If they write to Superior quoting this message they will receive a signed certificate.

Written by top authors Peter Scott and Gary Partis, Hostages costs £9.95 for BBC/Electron cassette, £11.95 for 5.25in disc, £14.95 for Master Compact 3.5in disc and £19.95 for BBC A3000 and Archimedes.

Also new from Superior is sporting simulation Superior Golf with construction kit. It features realistic strokes, three levels, six courses from St. Andrews to The Belfry plus full-feature hole and course construction and editing.

Available only for BBC A3000 and Archimedes machines, it costs £19.95.

Computer keeps in touch

POINTERS on where England went wrong in the World Cup can be had from a BBC Master and two lecturers at Liverpool Polytechnic.

Mike Hughes and Tom Reilly, who teach Sports Science degree courses there, have developed a computer program which can pinpoint the strengths and weaknesses of both teams and individual players.

They video a match then put the data into their Master via a Concept keyboard. The data is based on up to 24 "action variables" such as pass, dribble, shoot, cross and tackle. They combine these with players names and positions and their software then produces analyses in just about any form a trainer or coach could want.

"The usual way of providing this information is by written report, but our system can produce it in the sort of detail which would be impossible by just watching a match", said Tom.

"We are nearly at the stage where we are thinking of marketing it as a service to clubs. We taped the Mexico World Cup to obtain useful data and did the same with all the England matches in the recent World Cup, plus some of the other games".

The system will work with all team games.

Minerva keeps busy

MINERVA (0392 437756) has launched Desktop Office, an integtrated suite for Archimedes and BBC A3000 computers.

It includes database, word processor, spreadsheet, charts and communications software aimed at education, small business and home users. Price, £99.95.

The word processor program in the suite, DTOWord, is available separately under the name EasiWord and costs £39.95.

Also new from Minerva is an upgrade to its multi-tasking graphs and charts package Graphbox.

It's the result of a collaboration between Minerva and Colton Software and offers a hot link to Pipedream 3. So a graph produced from data generated in Pipedream 3 will be re-drawn automatically when the data is altered.

Two other features added to Graphbox are that it now sits on the icon bar and offers manual scaling in addition to the automatic scaling previously used.

The price remains at £79.95 with an upgrade offer for existing users of £11.50.

Minerva has also produced PC Access, which allows PC discs to be both read and written on the Archimedes and can also be used to read and write Atari ST discs. Price, £39.95.

Rounding off the company's new releases is Red-Shift, a fast-scrolling arcade game for the Archimedes and A3000. Set in the year 2240, it challenges you to take on evil forces and regain control of the eight worlds of the solarian constellation. Price, £17.95.

Curve helps

PURCHASERS of Acorn's education bundle, The Learning Curve, are helping provide work for the disabled.

The packages are being assembled by members of The Papworth Group, an organisation where 60 per cent of the employees are registered disabled.

DESKTOP OFFICE

THE INTEGRATED SUITE FOR ARCHIMEDES

DATABASE

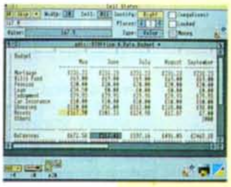
word - processor

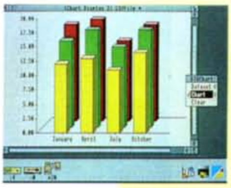
SPREADSHEET

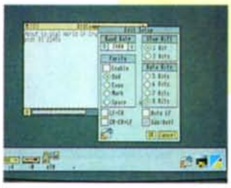
communications

- DATABASE
- WORD - PROCESSOR
- SPREADSHEET
- GRAPHS & CHARTS
- COMMUNICATIONS

£129-95 Incl. VAT







At last - a fully integrated suite of database, word - processor, spreadsheet, charts and communications for the Archimedes. The database is simple to set up with a flexible card layout enabling you to design cards to suit your data. Video style controls make it easy to browse through the records. With instant search on fields, sort routines and reports available, DTOBase gives flexibility whilst remaining simple to use.

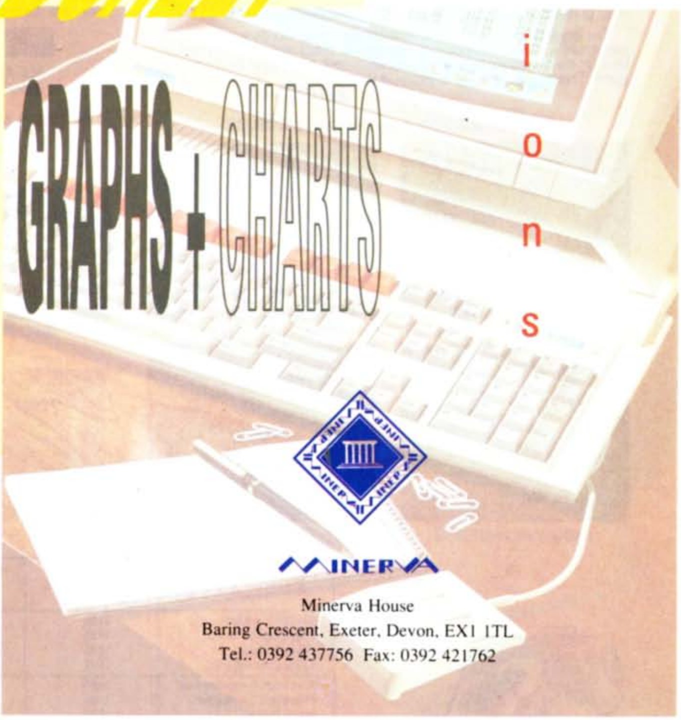
The word - processor, DTOWord is ideal for all types of correspondence, with the ability to change text to bold or condensed, indent, centre, justify etc. DTOWord makes every document look professional. Text can be any colour and even displayed in large characters on screen making this package ideal for young children or those with poor sight.

DTOSheet is fast and powerful but designed for ease of use. Columns can be held for reference and cells locked to prevent accidental deletion. With colours available to highlight negatives or formulae DTOSheet gives all the features you would expect of a high class spreadsheet. Data can be exported directly into DTOChart allowing pie charts, 3D bar charts, etc to be produced in seconds. Sections of pie charts can be highlighted and the colours changed to your requirements.

The final package in the suite is the communications program DTOComms. Multi - tasking, even on line, DTOComms supports ANSI and TV1925 emulations and is configurable for all baud rates and protocols. Text files can easily be transmitted and received.

DeskTop Office is a fully integrated, multi - tasking suite of programs for the Archimedes and A3000. Data can be transferred between the programs giving the ultimate in flexibility to produce graphs from your spreadsheet data or similar applications.

DeskTop Office is all you need for Education, Small Business or Home use.



MINERVA

Minerva House
Baring Crescent, Exeter, Devon, EX1 1TL
Tel.: 0392 437756 Fax: 0392 421762

EAS!WORD

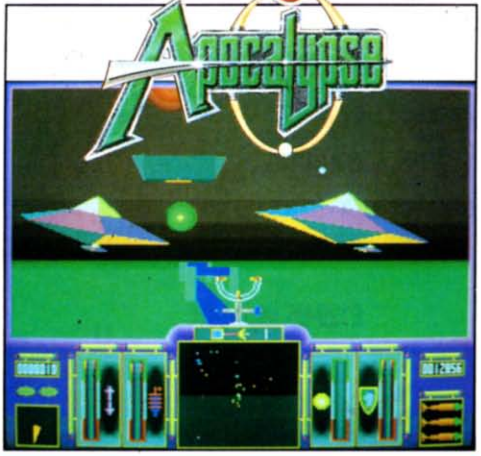
word - processor

Easiword is simplicity in itself and ideal for everyday word-processing needs. Easiword has all the facilities of DTOWORD together with the extra facility of multiple documents.

£39-95 Incl. VAT

A3000
ARCHIMEDES
BBC B/MASTER
ELECTRON

THE 4TH



APOCALYPSE

Apocalypse is designed purely for the Archimedes. Utilising the machine's colossal processing power combined with ingenious programming techniques, the author has created a masterpiece which could not have been produced on any other home computer. The author is of course Gordon Key who already has Holed Out and E-Type under his belt. Apocalypse is by far his best work to date.

The game places you on the surfaces of varied futuristic hostile planets colonised by ruthless enemies. With your highly advanced craft you must find your way around the planets and systematically annihilate the enemy. Your ship, which can fly or move along the ground, is extremely fast and can even fight whilst hurtling backwards.

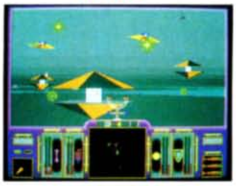
The graphics are truly unbelievable. The solid, shaded 3 dimensional buildings and objects are animated more quickly and smoothly than ever before. If you shoot at them they explode in a way that is terrifyingly real often catching fire before bursting into a ball of flames accompanied by devastating sound effects.

Initially Apocalypse is easy enough for a beginner to enjoy but as you progress your foes will become increasingly hostile and you will discover fascinating new objects. These can have strange properties and many may need to be destroyed. It will be up to you to discover how.

The Royal Guild of Spacing will monitor your progress as you play. Your performance will be assessed at appropriate times and you will need to impress them if you are to continue your adventure. Apocalypse is an amazing game. There's only one way to describe it....

RAW EXCITEMENT.

PRICE: A3000/Archimedes £29.95



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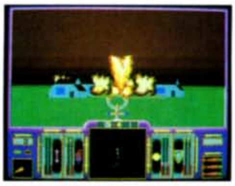

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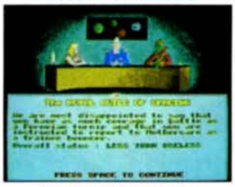

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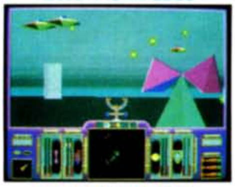

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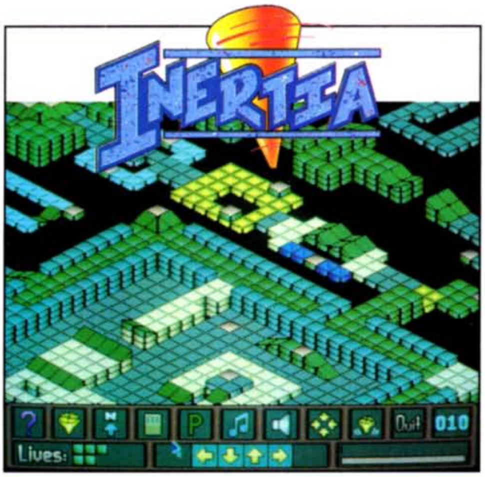


INERTIA

Inertia is a totally original game with a huge landscape just waiting to be explored. It is available for the Archimedes, BBC Micro and Acorn Electron. Scattered (or rather fiendishly placed) around the landscape are many special tiles which need to be collected. Your highly sensitive craft floats freely around the landscape and you must exert forces upon it to guide its speed and direction.

You have a 3 dimensional viewpoint displaying a tiny fraction of the total playing area. There are walls, bridges, tunnels and ramps to negotiate and a host of mystery tiles with strange properties indeed. These include ice, jump and transformation tiles. There are even certain tiles which alternate the controls so that everything works in reverse.

This massive game has been very carefully put together and solving the puzzles within it will need lateral thought and a lot of dexterity.

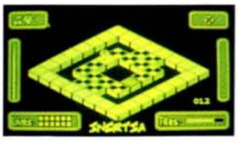
The Archimedes version is considerably enhanced with digitised sound and music. It even features a full colour 3 dimensional map of the game which is a joy just to wander around. You'll certainly be amazed at the size of the game and the variety within it.

Inertia is a game for the determined. Each version makes full use of the ability of the computer so make sure you've got plenty of time to spare. Once you have started you won't be able to stop.

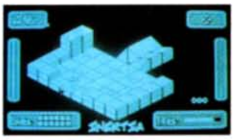
Electron User Golden Game May'90

*BBC Micro and Acorn Electron versions available **NOW**.*
Enhanced Archimedes version available in June, 1990.

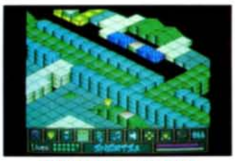
PRICE:		
	A3000/ Archimedes	**£19.95**
	BBC B/Master 5 1/4" disc	**£12.95**
	Compact 3 1/2" disc	**£13.95**
	BBC/Electron Cassette	**£9.95**



BBC B/MASTER



ELECTRON



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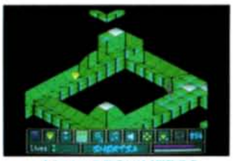

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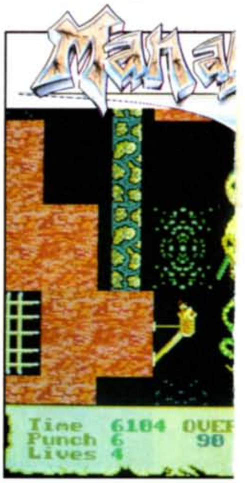


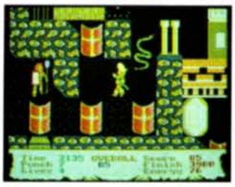
MAN-A

In the age when the castle was supreme it took dedicated warriors to overcome their defences, to loot and pillage, and finally to destroy.

You are armed with a mighty sword cast from the remains of a thunderbolt which fell from the sky many millennia ago. Also in your possession is a magic potion which makes you invincable to all for short periods of time. Armed with these you must penetrate the inner recesses of 4 castles and do battle with all you find in them.

As you progress you will discover many intriguing objects which can behave very strangely. Many are documented such as wooden panels, hour glasses, thorns, portculli, mirrors etc.. But most are

PRICE: A3000/A



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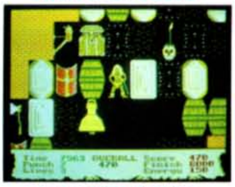

A3000/ARCHIMEDES

ALSO AVAILABLE	A3000 AND ARCHIMEDES 31/2" DISC	BBC B AND MASTER 51/4" DISC	BBC AND ELECTRON CASSETTE	MASTER COMPACT 31/2" DISC
UIM (3D Action Adventure)	29.95	19.95	-	21.95
E-Type (3D Car Racing)	19.95	14.95	9.95	15.95
E-Type Designer	16.95	-	-	-
E-Type Extra 100 Miles	16.95	-	-	-
White Magic (Arcade Adventure)	19.95	12.95	9.95	13.95
White Magic 2 + Designer	19.95	12.95	9.95	13.95
Arcade Soccer	19.95	12.95	9.95	13.95
Holed Out (3D Golf)	19.95	14.95	12.95	15.95
Holed Out Extra Courses 1	16.95	11.95	9.95	12.95
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Holed Out Designer	19.95	-	-	-

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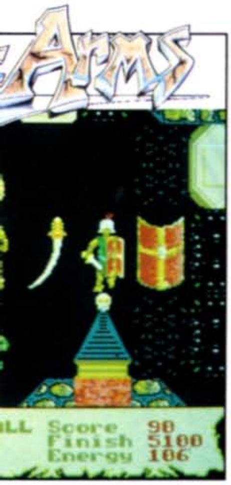

-ARMS

not. When you think your stuck, experiment and you'll discover properties you never knew existed.

The subtle blend of arcade timing and adventurous puzzles make Man-At-Arms fiendishly addictive. You must plunder each of the 4 castles which become increasingly "puzzling" as you progress. Your overall objective is to kill all foes with your mighty sword and to plunder as much of the most valuable treasure as you can carry.

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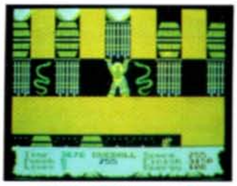

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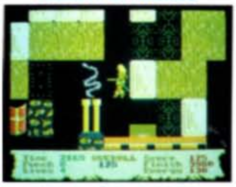

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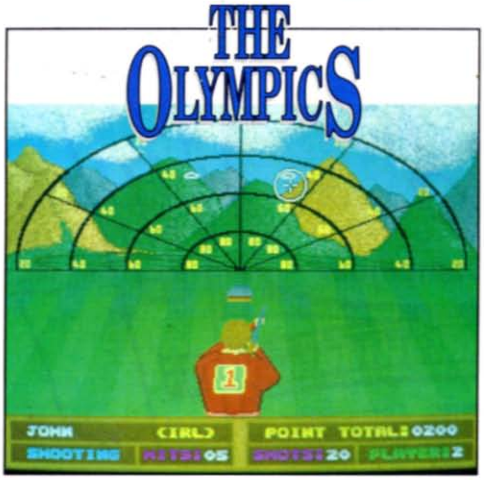


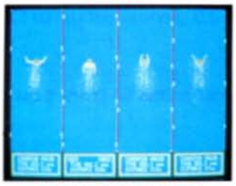
THE OLYMPICS

The Olympics is an experience which can be played by 1 to 8 players. It contains a superb piece of music, opening and closing ceremonies and 14 national anthems. When a player wins a gold medal the national anthem for his chosen country is played. Any World Records that you achieve can be saved to disc. With the click of a button all the relevant information concerning the record is automatically saved including your name, the exact time, day and date!

It is comprised of 6 main events: Diving, Shooting, Javelin, Swimming, Canoeing and Pole Vault. Some of these have several "sub-events" to choose from - there are 2 Shooting events, 12 Swimming events and 3 Canoeing events. These events have been chosen for maximum variety and enjoyment. They will "extract" all sorts of abilities: manual dexterity, timing, memory, perserverance, adaptability and above all guts!

The menu systems are controlled entirely with the mouse. As such they are extremely easy and quick to use. All events can be practiced or competed in individually, or altogether for maximum Gold, Silver and Bronze medals. You can also play all 6 events as a sort of "hex-athlon" where points are awarded for each event - the player with the greatest number of points is deemed to be the winner.

PRICE: A3000/Archimedes £19.95



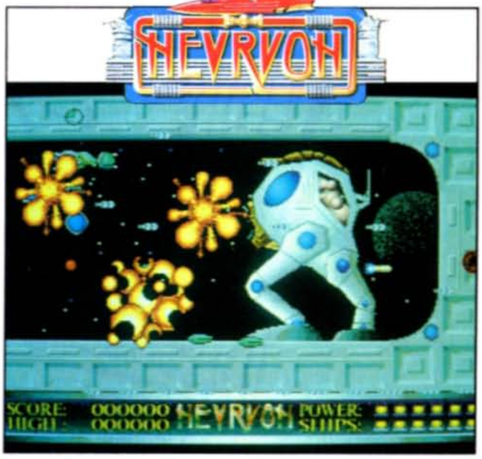
A3000/ARCHIMEDES

A3000/ARCHIMEDES

WORLD RECORDS
MAIN MENU
RECORDS

A3000/ARCHIMEDES

A3000/ARCHIMEDES



NEVRYON

This fast arcade game is disc based only and boasts 100K of graphics and game code for the BBC and 2 discs of over 1.5 megabytes for the Archimedes. It is a fast sideways scrolling shoot'em up which features 8 levels of furious opponents and very varied and very detailed graphics.

You fly a spaceship which can attain immense firepower - more lasers, a ram, gun droids and highly destructive missiles which are released from the top & bottom of your ship, then ignite and shoot forwards.

Whilst the BBC version is superb, the Archimedes version has been considerably enhanced and is truly exceptional putting many arcade games to shame. Nevryon uses the machine's raw power to full effect and gameplay is second to none.

It comes on 2 discs and features 5 true levels of parallax scrolling, more than 50 objects on screen, over 1 megabyte of 256 colour graphics, digitised stereo sound and music etc. etc.. You control a different ship on each of the 4 scenarios and there are a seemingly infinite number of weapons to collect and use. End of level monsters are beautifully animated but are anything but friendly.

BBC Review: "Graphics are very colourful and hectic, with explosions, missiles and aliens all heading for your ship. Together with a scrolling landscape, complete with stars moving in the background, they combine to form an enjoyable and action packed game." Micronet, Feb'90.

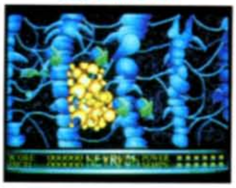
*BBC Micro version available **NOW**.*
Enhanced Archimedes version available in June, 1990.

PRICE:		
	A3000/ Archimedes	**£19.95**
	BBC B/Master 5 1/4" disc	**£14.95**
	Compact 3 1/2" disc	**£15.95**

BBC B/MASTER

BBC B/MASTER

A3000/ARCHIMEDES



A3000/ARCHIMEDES

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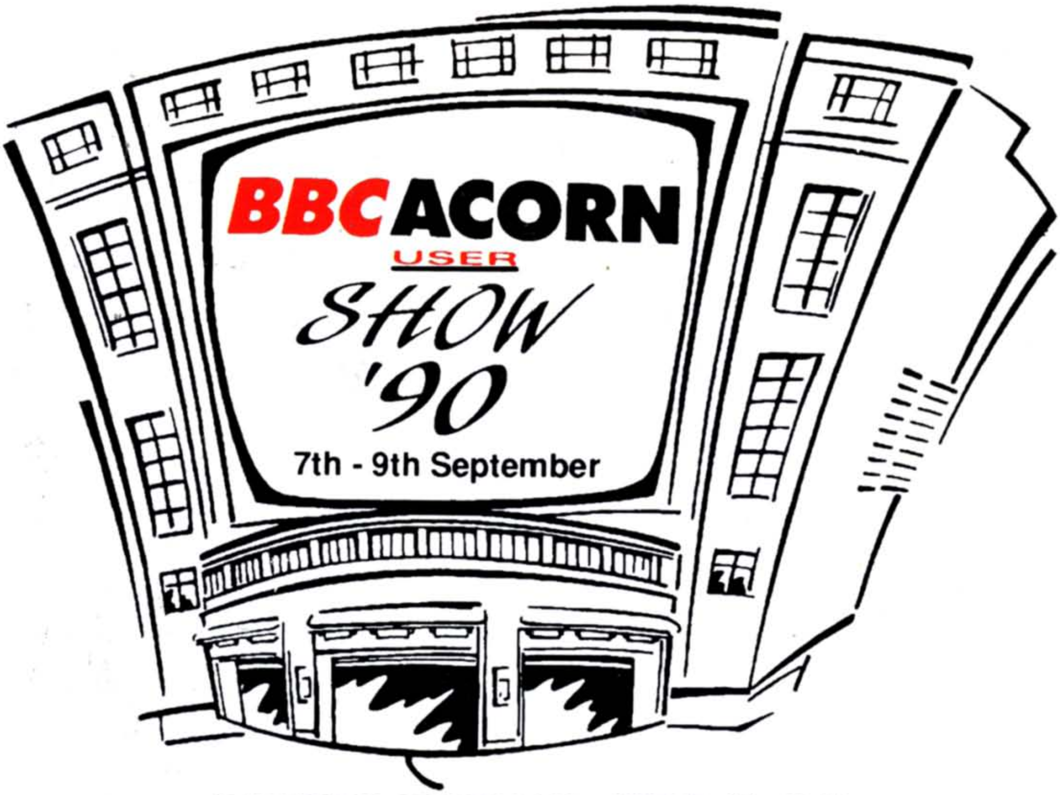

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PINEAPPLE SOFTWARE

The Pineapple Software Real Time Colour Video Digitiser

What is a Real Time Video Digitiser? There are quite a few different 'Digitisers' available for the Archimedes but very few can accurately claim to fit the above description. The requirements are that it must be able to 'grab' a single field of video information from a colour moving source, such as a video recorder, TV, or video camera, and then process the image and display it on the computer screen.

The Pineapple Digitiser does just this, – and at a price which is less than some Digitisers which can only handle static images.

HARDWARE

The hardware consists of a double width podule which fits inside a 300 or 400 series Archimedes, and comprises a PAL colour decoder, 256K memory and various control and interface circuitry. The PAL decoder converts the input signal from your TV or video recorder into separate red, green and blue signals. These are then converted into digital form and stored in the 256K ram in a format giving 512 pixels across the picture and 256 rows vertically. The video signal in the ram is constantly changing at the same rate as the incoming video picture until the podule receives a signal from the computer to 'freeze'. At this point the last picture in the ram is frozen and can be transfered to the computer screen in many different ways depending on which software commands are issued.

SOFTWARE

The software to drive the podule is supplied on disc in the form of a relocatable module. This provides a host of additional '✱' commands and SWI's which can be used even by inexperienced programmers to produce very impressive displays of live pictures or ones previously saved on disc. For non-programmers, ready written programs are provided to explore all the features of the Digitiser and produce 'Sprite' images which can be used in many other applications and 'Art' packages. The software is very easy to use and scaling routines are provided which allow you to manipulate the grabbed image by selecting any part of the picture (using a box drawn on screen controlled by the mouse) and placing it on any area of the screen, again using a box to select the position and size. This enables multi-picture images to be produced very rapidly using either live pictures or ones you have previously saved on disc. The 80 page handbook provides full details of how to implement the commands even for the inexperienced programmer.

EDUCATION

The Digitiser has many uses in education. The software commands can show many of the effects typical of the digital storage of TV pictures which can help to explain the way in which TV works. It can also be used to produce powerful audio-visual displays tailored to your own requirements from images captured using video cameras etc. For younger children, programs can be created to help learning by giving high quality visual images of animals, birds, trees etc, built into a 'quiz' format. The possibilities here are endless.

FUN & GAMES

As well as showing off to all your friends who don't have an Archimedes, what a great computer it is, you can use the Digitiser to produce images for all sorts of games and visual demonstrations. Games such as 'Guess the Celebrity' or 'Guess the Advert' can be produced by even inexperienced programmers, simply by 'grabbing' all the necessary images from TV and saving to disc.

SPECIFICATION

Video Inputs	Pal coded video, .75 Volts – 2·5 Volts pk to pk R, G, B & sync input All inputs may be terminated by internal DIP switches.
Resolution	512 x 256 pixels
Storage system	Standard version 4 bits Red, 4 bits Green, 4 bits Blue – 192KRam Extended version 5 bits Red, 6 bits Green, 5 bits Blue – 256K Ram
Picture Area	The Digitiser harware allows the full screen area normally viewed to be stored in the podule ram. Horizontal shift, Vertical shift and width can be adjusted internally if required.
PAL Decoder	The PAL decoder provides manual control of Brightness, Contrast and Saturation, combined with full auto saturation control.

QUESTIONS & ANSWERS

Q – What is the difference between the 12 bit and 16 bit version?

A – The 12 bit version can produce very high quality pictures, those shown on this page were produced that way, but 16 bits can give even better results particularly in high resolution screen modes.

Q – Why have an R, G, B input?

A – For those who have professional video cameras capable of producing R, G, B outputs, the R, G, B inputs can give significantly better results than the PAL inputs by avoiding the coding-decoding process. This removes some of the defects of the PAL system such as cross-colour, and also reduces noise.

Q – Is a moving picture available?

A – Yes, you can show a real live moving TV picture on the computer screen. This means that if you are using a video camera or recorder as an input source then you don't need a separate monitor to frame up the picture.

Q –Will it work on the A3000?

A – Yes, but you need an inexpensive adapter box which we can now supply.

Q –Are the controls difficult to set up?

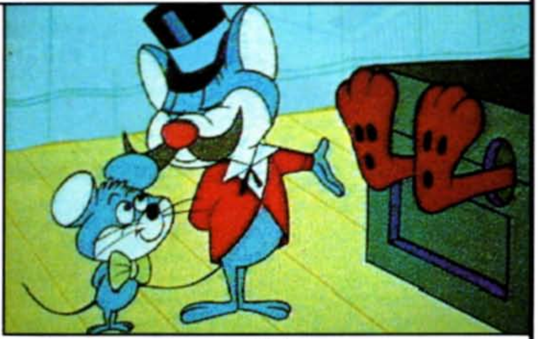
A –No, the three controls are exactly the same as on a normal TV set, Brightness, Contrast and Colour (Saturation). They may appear difficult to get at as they are at the back of the computer, but once set to your preference the brightness and colour should not require further adjustment, and the contrast (which is the easiest to get at) will only need adjusting if the video input source is changed.

Q –Does it take a long time to Digitise a full screen colour image?

A –Not really, a full screen image takes just 6 seconds on a standard 310, and reduced size images take proportionately shorter times.

Q –What software commands are built into the module?

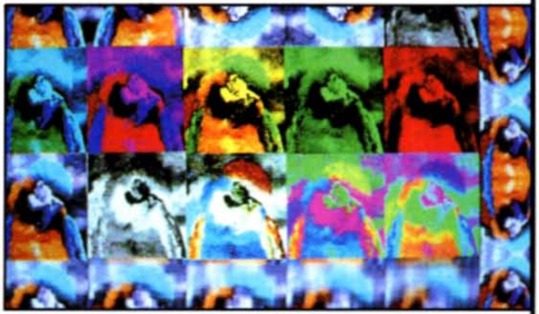
A –The software is under continual development and updates will be made available under our usual updating schemes (i.e) most updates are free), but the currently available commands are :- Average, Bits, Default, Digitise, Flip, Focus, Freeze, Image, Loadscreen, Loadsprite, Loadvideo, Mono, Moving, Negative, Noise, Outline, Palette, Primary, Restorescreen, SaveAIM, Savescreen, Savesprite, Savevideo, Screenarea, Setvideo, Unfreeze, Videoarea.



Cartoon

I ♥ BLUE PETER
THE PYRAMID GAME
BBC 1
THE PEUGEOT 405

A Multi Picture Image



Some Digitiser Effects

– 'Pineapple has produced one of the 'ultimate' Computer Video Digitisers' –

–'The Pineapple Colour Digitiser looks to be one of the most professional products yet to be seen on the Archimedes'–

Acorn User – April 90

Prices:

Standard	**£285**
Extended	**£315**
A3000 Adapter Box	**£65**

POSTAGE AND PACKING FREE

BBC PCB Designer

This ever popular Rom based PCB designer is suitable for all BBC micros. It's fast high density 1:1 scale print routine allows prototype boards to be made directly from a printout, and a 2:1 scale print may also be used to produce professional quality boards. A second Eprom is optionally available to add a powerful auto-track routing facility to the program. This utilises a 'rats-nest' input routine and allows any component to be 'picked up' and moved around the board without having to re-specify component interconnection.

The full auto-route facilities are available even on a standard unexpanded model 'B'.

'PCB Autoroute is remarkable. No similar software comes near the price.'

ACORN USER Aug 88

PRICE	Manual track routing	£85.00
	Auto track routing	£185.00
	Plotter Driver	£35.00
		P&P Free

Still available at new discounted price!
DIAGRAM II £25.00 !!!

ADFS Utilities Rom

ADU is an invaluable utility for all ADFS users. It adds over 22 new ✱ commands to the ADFS filing system as well as providing an extensive menu facility with over 35 sub commands covering such areas as repearted disc compaction, saving and loading Rom images, auto booting of files, and many more. Transferring of files from DFS to ADFS is also made very easy.

ADU ....£29.00 P&P free

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Access

UPDATE

Bigger initiative

ACORN is to expand its home and school education initiative to the whole country following the success of the pilot scheme which was restricted to five education authorities. Head teachers of every school in the country have been invited to participate. The initiative aims to encourage combined efforts by schools and local Acorn dealers to help parents understand the growing importance of new technology to their childrens' education.

Since the start of the scheme, 12 specially recruited Acorn dealers have organised events in more than 100 primary, junior and secondary schools.

University gigabytes

THE University of Sussex plans to install a £1.3 million computer system to cover the whole of its campus and as The Micro User went to press, Acorn Computers had been shortlisted to provide part of the hardware.

Acorn's proposal is for an installation of several hundred Unix-based systems providing up to 2.5 gigamips of processing power and 25 gigabytes of shared disc space with full Ethernet networking.

Things for the Arc

THINGS To Do With Words and Things To Do With Numbers from Soft Stuff Software (0732 351234) are now available for Archimedes machines. Both packages include a suite of three programs for five to 12 year-olds, each with four levels and conforming to the National Curriculum. Price, £24.95.

Also in the pipeline from Soft Stuff is a new version of its successful Let's Spell series – Let's Spell Out and About and looking towards Christmas, David Chamberlain of Soft Stuff plans to launch Let's Tell which allows children to create a picture, add words then see their efforts animated with sound effects.

Canada calls

ACORN has achieved an overseas boost by being placed on the list of approved suppliers of computers for schools in Ontario, Canada where it uses Olivetti as a distributor.

The announcement is also good news for UK software houses producing educational programs. The manager responsible for development of schools business in Ontario, Dorothy Netherwood, is keen to hear of good software for use in schools. She can be contacted at the Product Sales Division of Olivetti Canada, PO Box 3710, 160 McNabb Street, Markham, Ontario, Canada L3R 6G9.

Pattern makers

FRIEZE
KALEIDOSCOPE
slower or fa
choose

TWO BBC Micro programs which teach mathematical principles through computer aided design have been launched by ESM (0223 65445). Frieze and Kaleidoscope allow pupils to use their computers for creating patterns not possible with pen and paper.

With Frieze, pupils can devise complex and colourful patterns using the mathematical concepts of reflection, rotation and translation. With Kaleidoscope, they can investigate the congruence of simple shapes by rotating and reflecting images around a central point.

After creating their designs with the on-screen drawing board, they can go on to produce their own 2D shapes for colourful wall displays.

Frieze and Kaleidoscope were developed by educationalists at Homerton College, Cambridge under the direction of Fred Daly, a well-respected figure in IT education and were officially launched at a reception in the college. They relate to the first level of maths attainment targets 1 and 9, levels five and six of attainment target 10 and levels two and six of attainment target 11. Both cost £40.25 on BBC 5.25in disc.

Also new from ESM are World Map Study for history and geography students and a maths series called Number in the National Curriculum. World Map Study is a map-based database which presents students with an on-screen world map from which they can enlarge any continent for detailed statistical information on a chosen country. Seventeen categories of data are available including both human and physical facts such as surface area, gross national product per capita, military spending, teachers, child population, life expectancy and mortality rates. Students can update this information as they gather new data and can display it in colour as a map, a bar graph or a scattergraph.

Operated with a simple icon-driven menu, the software comes complete with data on 127 countries and costs £34.50 on BBC 5.25in disc.

The Number in the National Curriculum series comes in three packs which deal with the basic concepts of maths. Getting Ready for Maths introduces pupils to simple ideas such as matching, numbers, sequencing, recognising numerals and investigating maths patterns.

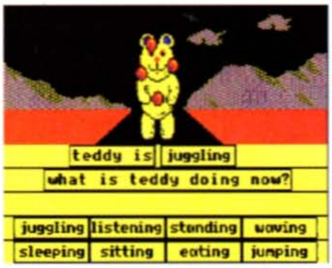
Place Value Activities goes a step further and presents pupils with exercises on the ordering of two and three digit number sequences, addition, subtraction, halving and doubling while Number Games deals with maths investigation work and problem solving. Written by respected educational author Anita Straker, the packages cost £21.27 each on BBC 5.25in disc.

ESM has just become one of the 14 companies out of 120 applicants to receive government funding under the Educational Software Development Partnership scheme of the National Council for Educational Technology. The funding is for development of two cross-curricular packages which will be launched in 1992.

More fun comes to the school

A WHOLE new generation of interactive learning games featuring improved graphics and developed in line with the National Curriculum, have been included in Fun School 3, Mandarin Software's successor to smash-hit Fun School 2 which sold more than 150,000 copies to become the most successful educational package in the UK.

Three suites of programs cater for under fives, five to sevens and over sevens. Graphic artists, educationalists and programmers have pulled out all the stops to provide children with colourful screens and thought provoking games guaranteed to encourage learning. In the under 5s set, Alphabet uses the colourful scenario of a fairground to teach letter recognition and matching.



teddy is juggling

what is teddy doing now?

Farm gives free rein to artistic skills with pigs and cows to be coloured in the farmyard and Gallery is a recognition game in which children have to match words with pictures.

The Fun School Teddies are back in abundance with Matching which challenges children to match shapes, Actions which allows them to control what Teddy does by choosing the right command and Counting which is an upgraded version of Fun School 2's Teddy Count.

"We have built on the winning formula of Fun School 2 and have worked much harder on the graphical concept with artists producing a quality of graphics comparable with bestselling games", said managing director of Mandarin, Chris Payne. "Our educationalists and teachers have also ensured that Fun School 3 is in line with the all-important concepts of the National Curriculum".

BBC Micro and Archimedes versions are due out soon. Prices range from £12.99 to £24.99.

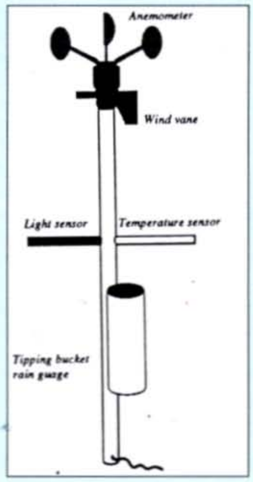
Class can keep an eye on weather

MOST young children find it hard to relate the computers in their classrooms to real life but an automatic weather station about to be launched will allow them to do just that. If the trees are being battered by the wind, it's raining outside or the sun is hot, they will be able to see this instantly and graphically reproduced on their computer screens.

On an entirely different level, secondary pupils will be able to use the same package to prepare histogram graphs, pie charts, scattergraphs and a host of statistics based on detailed weather data collected over long periods of time.

The source of these varied school projects will be Weather Reporter, a joint project from Surrey-based Aardware Design and the Hatfield Advisory Unit.

Designed to Met Office standards, this robust fully automated system measures wind speed and direction, temperature, hours of sunshine and daylight and amounts of rainfall. The necessary instruments are fixed to a standard 1.5in TV aerial pole which needs only two brackets to fasten it to any building. Housed inside the pole is a single chip microprocessor which stores detailed weather data for the last 60 hours or daily weather summaries for the last 59 days and means that the equipment does not always have to be plugged into the computer. Information is downloaded into BBC Micros or Archimedes machines through a serial interface via a cable included in the package.



On the daily program, Weather Reporter logs data each day at 9am, showing maximum and minimum readings over the last 24 hours. It can also be programmed to take more detailed readings over specified periods of time, particulary when abnormal weather conditions are expected.

A Weather Now feature allows current weather conditions to be shown directly on-screen and all data can be easily transferred into the popular Quest, Key and Graph databases used in schools.

"The concept of Weather Reporter is to allow pupils to collect data from the world around them", said Dave Wingate of Aardware. "The ability to collect this and include it in databases shows them how computers can be used for real life applications rather than just word processing and games. A box lands on their doorstep, they can easily erect the pole then it's just a case of feeding the cable through the window and off they go".

Weather Reporter should be available soon from The Advisory Unit for Microtechnology in Education (0707 265443) and will cost just under £300.

Curriculum recorder

WHILE the National Curriculum may be applauded from an educational standpoint, it is cursed by primary school teachers faced with mountains of supporting paperwork. H.S.Software (0792 204519) claims to have the remedy with Nstore, its program for keeping and reporting detailed National Curriculum records.

For use with BBC Micros and Archimedes machines, Nstore is contained on one disc. The Archimedes and A3000 versions store attainment records from levels one to six in all core subjects for as many as 432 children.

Up to 432 topics can also be stored on the program disc with the particular statements of attainment they cover and the files of all children in a class can be automatically updated to take account of a topic being covered in class. The BBC Micro, Master and Master Compact versions only hold data on 36 children and 36 topics.

Mouse–driven with friendly windows and menus, Nstore will produce statistics on individual children or on a whole class which can be exported to other packages such as word processors. It will provide detailed printouts and rankings of childrens' scores.

The Archimedes and A3000 disc costs £24.95 and the BBC, Master and Master Compact, £19.95.

Modern Languages and the computer

TEACHERS toying with the idea of introducing computers into their modern language classes could benefit from a report just published by The Advisory Unit for Microtechnology in Education (0707 265443). It has been compiled by staff from language departments in five East Herts schools which recently brought computers into their lessons.

The report Modern Languages and the Computer starts with an introduction to the equipment needed and how to make it work, adds useful tips for language teachers, evaluates most programs on the market and provides practical help on using the French database Teletel. It judges the effects on teaching and learning styles, covers word processing needs and suggests areas for development and support.

Costing £3, Modern Languages and the Computer is available from the advisory unit at Endymion Road, Hatfield, Herts, AL10 8AU.

THE MAIN DIFFERENCE BETWEEN INTERDICTOR 2 AND A MODERN JET FIGHTER...

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Acorn

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You'll also find a modern jet fighter a little too large for your tabletop and, unlike Interdictor 2, it requires around 25 groundstaff to get it airborne.

Best to stick with flight simulation, we think. And with that in mind, allow us to introduce Interdictor 2. It is written by the same people who brought you Interdictor but it's bigger, better, smoother and (believe it or not) faster.

It has a more realistic aircraft model, an easy to fly training mode, a new navigation system allowing route planning, way point setting and mission pre-planning. Added to this is LOCSAC a new local Situational Awareness Computer that allows you to monitor the local situation. You'll fly over 10,000 square kilometres of trees, mountains, roads, rivers, railways, lakes and much, much more.

The main scenario contains nine sub scenarios of varying difficulty. There are more types of air and ground vehicles with more weapons. Enemy aircraft have more in-built intelligence and defence, and let's not forget one vital point; they're all out to get you. And there lies the real difference between a genuine jet fighter and Interdictor 2.

If you get shot down, with Interdictor 2, you simply start all over again. And, by the way, Interdictor 2 only costs **£34.95 (inc VAT).**

CLARES
MICRO SUPPLIES

98 Middlewich Road, Rudheath, Northwich, CHESHIRE CW9 7DA.
Telephone: 0606 48511 Fax No: 0606 48512

Getting with the

THERE are some basic concepts about micros that we accept without thinking: Input is via the keyboard, clever things happen inside the Beige Box, and output is via the VDU or printer.

Over the past few years there have been attempts to expand this setup which, though familiar, may not always be appropriate. It's the input side of things we are interested in here.

Replacing the keyboard is a priority because it causes problems. It isn't good for inputting graphic data – light pens and graph pads do that much better. It's very good for entering text, but it is limited if we want to input whole words at one touch or restrict the options available to the user.

Then again, people with poor motor skills have difficulty using it, especially with multiple keypresses using Shift or Control. A system which gets around this problem is the Concept Keyboard which has been around now for about five years and is slowly but surely gaining In popularity.

It has broken the vicious circle that prevented other add-ons from becoming accepted: A system will not get support from software publishers until enough people have it, but people won't buy it until there is software support for it.

What you get is a flat pad in either A3 or A4 size which is divided into 128 or 256 cells in a grid. The principle is simple, the device is connected to the Acorn user port and software can detect when any given area is pressed – 32 bit users need to install a user port.

What the software then does is entirely up to the programmer. Immediately you can see that this does not have to upset the overall function of a given package – the Concept Keyboard can be tacked on to any system that requires input.

So what use is it? Firstly it can remove clutter. Many packages at the lower end of the age range may only require a child to use a given set of keys, maybe just numbers. Instead of having little fingers wrestle with the keyboard you can construct an overlay, that is a piece of paper that goes over the Concept Keyboard through which the children press the individual cells.

If you're only using numbers the cells can be grouped so that the child has a large area to press for each number. If you only have two choices then you could divide the whole thing into two. And, because the pad is context free, you can put whatever you like on the overlay. This means that you could give children pictures or colours to press – and this opens up the machine to pre-readers.

The option–limiting aspect of the device is applicable right up the age range and is used widely in the workplace – next time you order a Big Mac you'll see a similar idea in action.

> *‘The Concept Keyboard can be tacked on to any system that requires input’*

Software compatibility

Many adventure games provide overlays that are a colourful and interesting alternative to the keyboard. Dragon World, Zoopack and World Without Words from 4mation, most of the Sherston range, and many others.

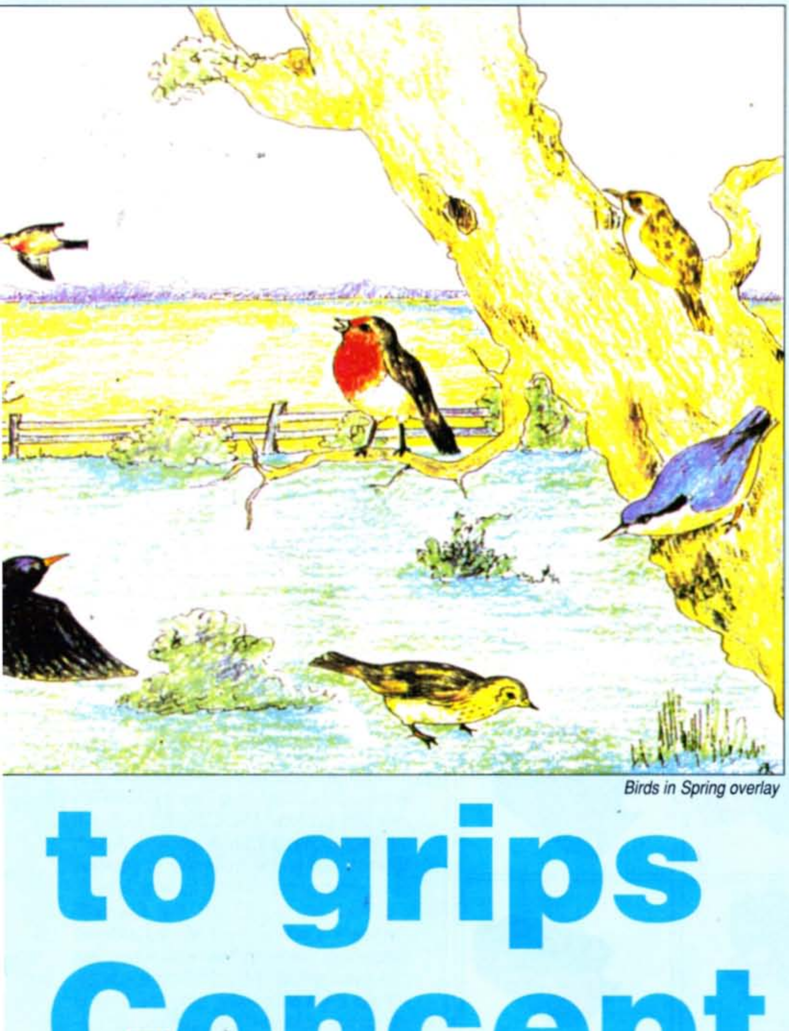
These are a great way to start using the Concept Keyboard in your school as they require no more effort than plugging the thing into the computer.

A huge range of other software uses the Concept Keyboard as if it were the computers own, it simply limits choice and thus speeds up responses letting the children get on with the task in hand.

However, there is a whole other area of activity where the concept keyboard does things your ordinary keyboard could not. Perhaps the most obvious example of this is Touch Explorer Plus from MESU.

This is a context-free package that simply has the micro respond to touching the Concept Keyboard by printing out text. On the face of it this sounds rather dull, but the huge amount of support materials that have been developed to go with the package demonstrates just how flexible and useful it can be.

The information is organised into several levels for each overlay so that it can be explored several times with different



Birds in Spring overlay

to grips Concept

results. A nice example of this type of application is provided with the package called Night Town.

Its overlay is a large scale street map of part of a town and there are also five clock faces to press, each representing a level in Touch Explorer.

Pressing the 23.50 clock will allow children to find out what buildings are on the map and whether they are open or closed just before midnight – pressing a location on the map gives the information. Selecting the midnight clock gives children information on what is happening at about 50 locations in the town and give some clues to a coming road accident.

The children find they have to explore the area to make a plan of action. At 04.00 they will see the consequences of earlier incidents and encounter new events. By 08.00 the postman who was sorting letters is delivering them and night workers are heading home, while for others it's the start of a new day.

This timeline application will have uses in all areas of the curriculum. You could set up a nature area where the life cycles of given animals and plants are explored, watch a building going up or investigate what happens as it burns down. Historical events are a natural for this kind of treatment – anything where circumstances change over time and space.

Perhaps you could consider the levels as a measurement of depth. Taking this literally, you could explore a stretch of coastline or the geology of a region.

On the other hand it could be about the depth of information, Exploring a Nature Trail – Northwest SEMERC – does this in different ways with several overlays. The Minibeasts shows eight miniature nasties and at each level the information given is more complex. The Birds in Spring overlay has a more specifically skills-based progression. In level one touching a bird will give simple information about it and ask a fairly open-ended question to encourage discussion.

At the second level the questions can be answered by applying simple research skills to the Hatchford Park Nature Trail field guide and at level four the same idea, with more complex research skills, is applied to The Bird Life of Britain.

Levels three, five and six simply provide various information about each bird but of a type that would encourage the formation of a database.

If you use this on a Master there is a notepad function that lets children make notes as they go along and then load them later into a word processor.

Further applications involve the support of existing packages. Under test at the moment at MESU are Touch Explorer versions of Puff and The Lost Frog.

Word processing

Obviously this is a package with huge potential, but the important thing is the support – you are not stuck with trying to make all the overlays and files yourself.

Another major area for the Concept Keyboard is word processing. This is an activity that has moved further and further down the ability and age ranges over the last few years and several word processors will now support the device.

The idea is that you can give children a range of words used in a topic or are part of a reading scheme and let them be accessed from the keyboard.

This will again let children get on with the creative learning part of the process much more quickly. As overlay files can be saved to disc you can build up a set of resources in time, so gaining the maximum value for the effort you have put in.

A rather controversial use in word processing is to provide an alphabetical rather

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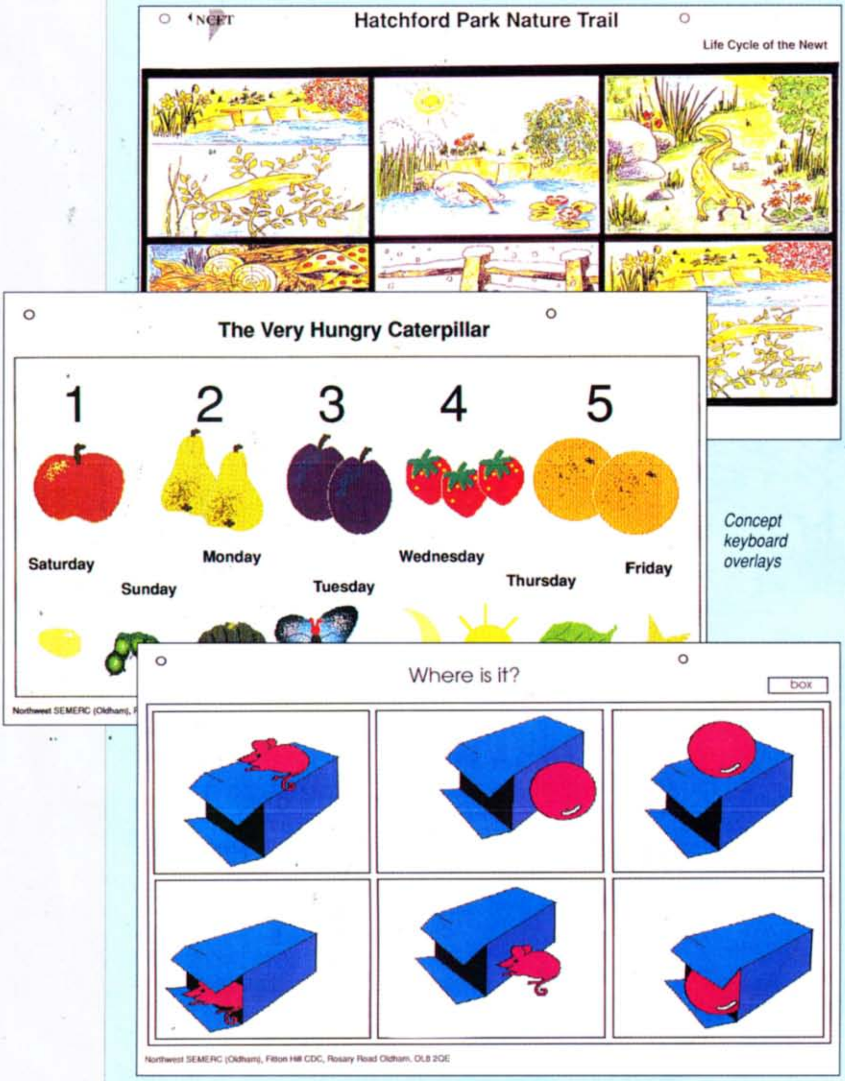
It may have sat unloved in a store cupboard, or it may be treated like a mythical enemy. Marshal Anderson takes a closer look at the Concept Keyboard and its use in schools


NCET
Hatchford Park Nature Trail
Life Cycle of the Newt
The Very Hungry Caterpillar
1
2
3
4
5
Saturday
Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Northwest SEMERC (Oldham),
Where is it?
box
Northwest SEMERC (Oldham), Fitton Hill CDC, Rosary Road Oldham, OL8 2QE

Concept keyboard overlays

➤

than qwerty arrangement of letters. Whether you like that idea or not, one that has to be of interest is providing two letter sets, one in upper and the other in lower case.

Perhaps the best example of this kind of word processor is Folio. The utility of setting up the overlay is very straightforward, giving you a graphical representation of the overlay on to which you draw boxes with the arrow keys.

Other word processors work in a similar way and some will printout an overlay outline for you. Unfortunately the new Advanced Folio (ESM) doesn't use the Concept Keyboard but there is an upgrade in development for early next year.

Other packages that give you access are PenDown (Logotron), Stylus (Newman College) and Prompt/Writer (NECT). One interesting aspect about visiting schools just starting with the Concept Keyboard is that often they have one of these packages and do not realise they are compatible.

There must be many applications that no one has yet got around to looking at. In the secondary school it might be nice to see foreign language characters available from the Concept Keyboard instead of complex multiple keypresses. It would also be useful if complex menu programs could be short-circuited by having a menu diagram that allowed you to go straight to the option required.

Getting started

So, how do you get started? First buy your keyboard. You will need to think about which size to get. The A3 board is nice for the lower age range and those with motor or sight problems but it does take a fair amount of space. Remember, you will need to be able to lay the thing out flat in a position where it and the screen can be seen.

The A3 version also allows you to make use of each individual cell, they can be difficult to use individually on the A4 pad. However, there's no doubt that the A4 version is easier to manage and will usually fit on any computer trolly.

Once you are set up look through the software you already have and see if any of it gives you a Concept Keyboard option – sometimes the information is well hidden in the manual.

Also keep an eye on the software publishers' publicity. Many are upgrading packages and these usually only cost a few pounds. Also you will have opened up the availability of Concept Keyboard–specific software so it would be worth reviewing packages you have rejected in the past, W. E. Software do a nice range.

Next it really is worth getting a compatible word processor and experimenting with your own overlays try SEMERC's Concept Keyboard Overlay Kit to avoid some of the sweat out of it, but you can do more.

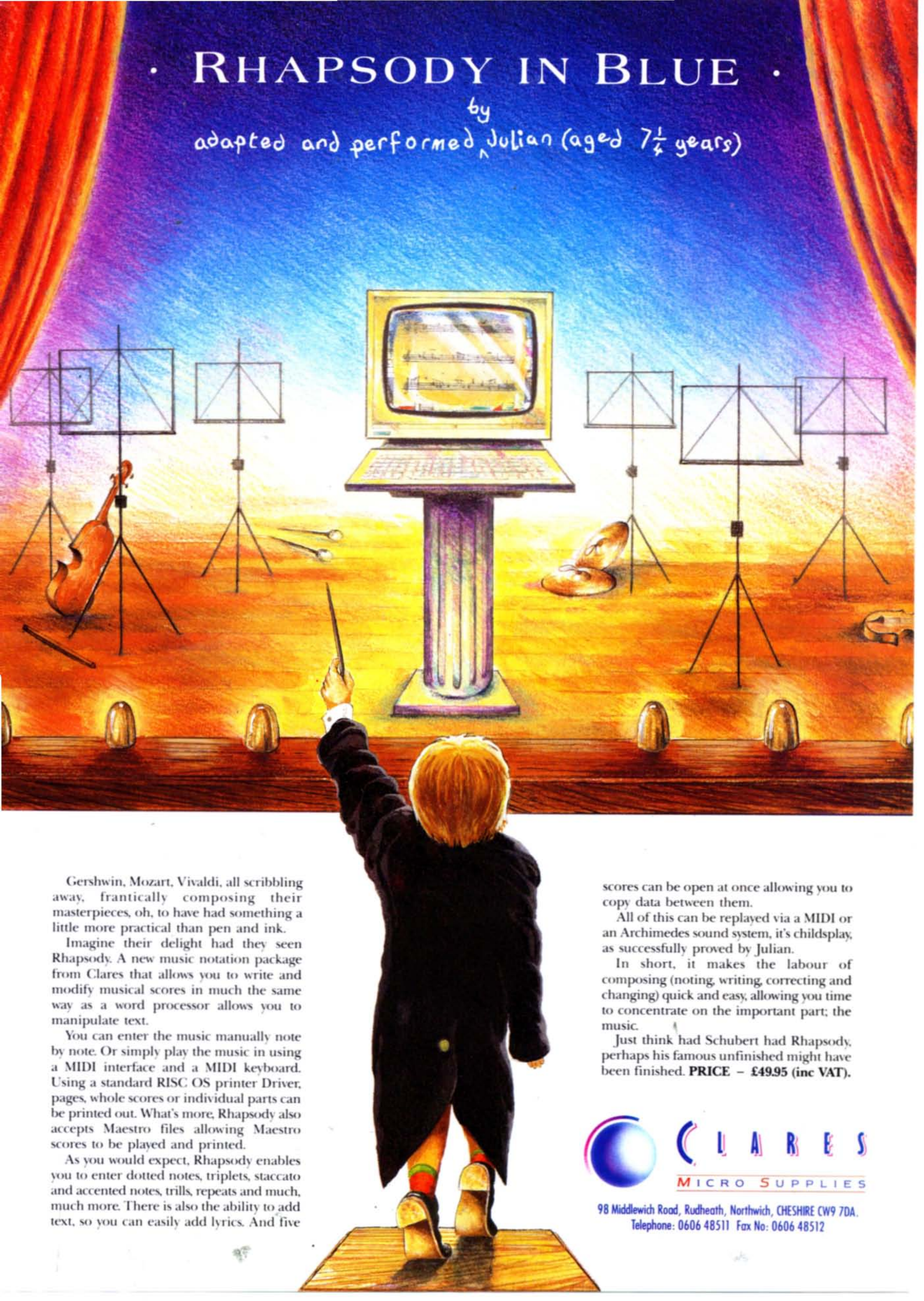
Concept, by Resource, is a utility that creates Concept Keyboard drivers for some existing software. This package requires a little perseverence, not in the overlay creation, but in the fact that the only way to see if it will work with a given package is to try. Having said that, there it will work with a good list of packages – Interword, Wordwise, Logotron Logo and Our Facts.

Other goodies worth a look are Concept Podd (ESM), Developing Tray 3 (SEMERC) and List Explorer (NCET). This last is a database that can link up with Touch Explorer and has a great deal of potential as it uses pictures as fields for searching.

Unlike other add-ons the Concept Keyboard is now well established and well supported. More and more software will make use of it to the point where schools without it will be missing out. The thing is not cheap, well over £100, and you will certainly want to start with only one but you'll soon wonder how you did without it.

Suppliers

4mation, Linden Lea, Rock Park, Barnstaple, Devon EX32 9AQ. Tel: 0271 45566.
MESU/NCET, Unit 6, Sir William Lyons Road, Science Park, University of Warwick, Coventry CV4 7EZ.
SEMERC, Fitton Hill CDC, Rosary Road, Oldham OL8 2QE.
Sherston Software, Swan Barton, Sherston, Malmensbury, Wiltshire. Tel: 0666 840433.
ESM, Abbeygate House, East Road, Cambridge CB1 1BD. Tel: 0223 65445.
The Concept Keyboard Company, Moorside Road, Winnall Industrial Estate, Winchester, Hampshire SO23 7RX. Tel: 0962 843322.
W.E. Soft/Mr J Truman, North School, Paddockhurst Road, Turners Hill, Crawley, Sussex RH10 4SD.
Resource, Exeter Road, Wheatley, Doncaster, South Yorks DN2 4PY.


· RHAPSODY IN BLUE ·
adapted and performed by Julian (aged 7¼ years)

Gershwin, Mozart, Vivaldi, all scribbling away, frantically composing their masterpieces, oh, to have had something a little more practical than pen and ink.

Imagine their delight had they seen Rhapsody. A new music notation package from Clares that allows you to write and modify musical scores in much the same way as a word processor allows you to manipulate text.

You can enter the music manually note by note. Or simply play the music in using a MIDI interface and a MIDI keyboard. Using a standard RISC OS printer Driver, pages, whole scores or individual parts can be printed out. What's more, Rhapsody also accepts Maestro files allowing Maestro scores to be played and printed.

As you would expect, Rhapsody enables you to enter dotted notes, triplets, staccato and accented notes, trills, repeats and much, much more. There is also the ability to add text, so you can easily add lyrics. And five scores can be open at once allowing you to copy data between them.

All of this can be replayed via a MIDI or an Archimedes sound system, it's childsplay, as successfully proved by Julian.

In short, it makes the labour of composing (noting, writing, correcting and changing) quick and easy, allowing you time to concentrate on the important part; the music.

Just think had Schubert had Rhapsody, perhaps his famous unfinished might have been finished. **PRICE – £49.95 (inc VAT).**

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Moving numbers

Back in the classroom, Rog Frost puts Sherston's Animated Numbers through its paces

Product: Animated Numbers
Price: £20.12
Supplier: Sherston Software, Swan Barton, Sherston, Malmesbury, Wiltshire SN16 0LH.
Tel: 0666 840433

IT'S quite rare for people to know the name of a games programmer. For an educational software writer to be so known speaks volumes for the quality of his output. Animated Numbers has such an author: It was written by the very talented Simon Hosler.

This program is designed for young children in the three to six age range and its main aim is to develop the link between the written symbol we use for a number and the value of that number.

In fact, the teachers' book lists three areas of the mathematics National Curriculum which this program can help with.

When you boot up you are presented with a title page which has the Hosler hallmark written all over it – it's colourful and imaginative. From here you can move straight into the program proper or the teacher can set up a number of options. These include setting the numbers which are in use, organising either computer or concept keyboard, sound and program order.

Once set up it's time for the youngsters to take over. For the first part of the program a number of objects are displayed in a tank: A fat little person called Numberbod must be directed to the numeral which matches the number of items in the tank. Moving Numberbod is simple. When a key is presses it moves to the next junction and waits for another key press.

When Numberbod reaches the right numeral the screen flashes in a multitude of colours to signal success. The screen then clears to start an animated display – the second part of the program. To begin this the correct number must be pressed on the appropriate keyboard.

Displays can be accompanied by a short piece of alliterative text such as *fireworks fire flames into a five*. The notes make it clear that three to five–year–olds probably won't be able to read this. If no adult is free to help this text can be turned off.

The third part of the program involves making links. Four boxes are displayed with a number of items and the number symbol is shown in the middle of the screen.

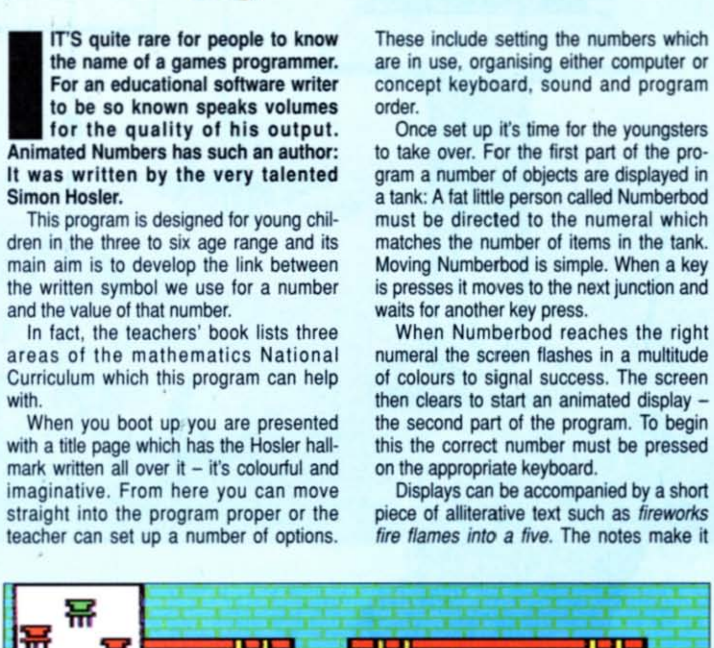
Each box flashes in turn and the number of items in it can then be increased or decreased until a match is reached. Another animated display then takes place. This might involve, for example, a set of yachts tipping out the sailor or some dogs jumping and barking.

The options allow these three sections to be taken in any order. If one of the sections is considered unsuitable for a particular group of pupils it can be missed.

Once all four boxes have been matched to the central number, the game is over and it re-starts.

As usual with Sherston programs, there is a comprehensive set of back up materials. Firstly, there are overlays for A3 and A4 Concept keyboards which could also make attractive wall displays. Then there are photocopy masters of the various sections of the program to allow for follow up work away from the computer.

Lastly there is the teachers' book which contains a wealth of advice about using the program. This covers the technical side of things and, more importantly, educational details.



Searching for number 10

Summing up

There can be little doubt that infant teachers will find this a very useful program to have in the classroom

Cheap at twice the price

Marshall Anderson takes a look at the Blue File

Product: Blue File
Price: varies
Supplier: Northwest SEMERC, Fitton Hill CDC, Rosary Road, Oldham OL8 2QE.

OVER the past few years educational software publishing in this country has settled down. Gone are the days when you were offered hundreds of programs of extremely dubious quality from as many suppliers with no track record to rely on.

The upshot is that most good software now comes from about 10 suppliers who have survived by producing consistently reliable and educationally sound packages.

No longer the result of two weekends hacking in the loft by an individual, put out with a photocopied sheet of instructions and a plethora of interesting bugs, rather development times are measured in months or years, though still usually in a loft. Manuals and support materials are professionally produced and usually comprehensive.

So what's the catch? The problem is that these companies are less likely – though not unprepared – to take risks. They need to know that a product will have a wide appeal and produce an income commensurate with the investment in time and cash.

This means that some areas of IT are less well supported. Special Needs is such an area, but more generally some excellent programs, often short and simple, can slip through the net.

At one time Mape was a good source of these programs, publishing them free to members, but recently its annual output has been limited to one, more ambitious, single package. Their function has been taken over by Blue File.

The Blue File catalogue contains upwards of 50 packages, ranging from neat little utilities to substantial programs generating loads of work in the classroom. All are freely copiable and all at little over cost price.

Many of the utilities are about giving you access to specific bits of hardware. Buttons is a keyboard emulator that will let you use up to 10 switches or the Delves keyboard with many existing packages, Floor Robots 1 and 2 puts switches, Micromike or joysticks in control of various turtles and Melogo puts single or double switch users in control of Logotron Logo.

You can see that there is an emphasis on special needs, but there will be more general appeal in utilities like Modern Language Characters that will add European characters to both screen and printout on packages like View, Wordwise and Teletype. All these utilities will cost you less the `5.

Further up the complexity scale are packs like Dress, which asks for clothes to be put on in a sensible order, likewise Cook Beans On Toast. There are several compilations of short skills-based programs for the lower end of the ability range in which you are bound to find something useful. Moving to more substantial packages, there is Developing Tray 3, the text disclosure program, which provides a wealth of ideas and example files as well as the option to link to the Concept Keyboard. There is also a simple version of the same package to use at the lower end of the school.

The Caption series allows children to word process on illustrated screens, and several theme packs are available, two on Christmas and two on the World Cup. This demonstrates the flexibility of the Blue File system, in which programs can consistently be added or removed from the range depending on their usefulness at the time.

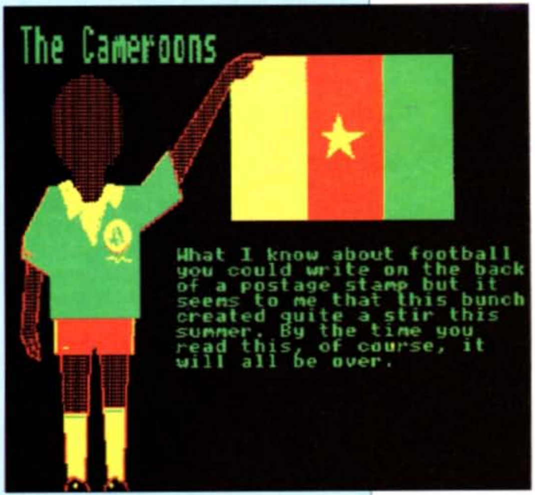
Perhaps the most impressive part of the range are the Proteus Scenarios developed from the excellent Moving In. These use a simple vocabulary to construct given scenes based on the themes provided. In Fantasy That, for instance, children can build up a picture using sentences like, "Put a giant in the streamæ, "Make it dark", "Change the frog into a princess".

Other scenarios include Our School, Toy Cupboard and Elmtree Farm. Again, these are only £6 each and if they fit into your topic will provide the basis for a lot of work. There is even a Scenario Designer for you to construct your own environments from scratch, though the catalogue is quite straightforward about the amount of work needed.

A couple of other gems are worth mentioning. Chatter puts two machines in contact with each other. The screen is divided into two, you type into the top half and this appears in the bottom half of the other computer's screen. This is the kind of simple but effective thing Blue File is so good at. Wordwise Lexicon adds a dictionary in junior or senior versions. The Machinery Is Missing gives you natural language in control technology.

Summing up

Most packages allow a variety if input devices and many will output to various speech synthesisers. All are straightforward and reliable to use and you are bound to find something here for your classroom.



```
The Cameroons

What I know about football
you could write on the back
of a postage stamp but it
seems to me that this bunch
created quite a stir this
summer. By the time you
read this, of course, it
will all be over.
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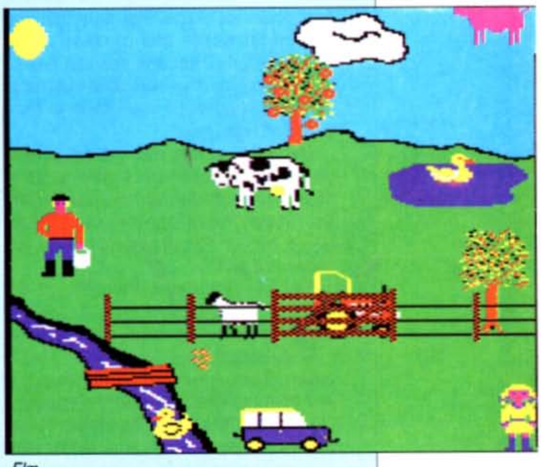
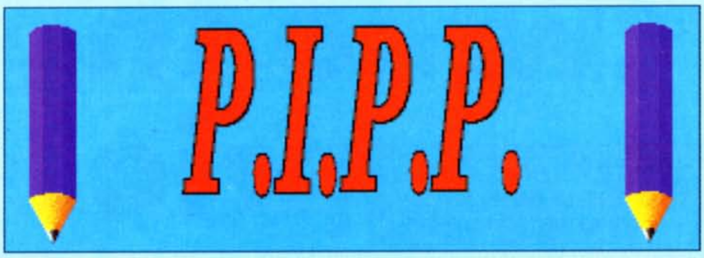
Caption



Elm

Getting the



John Clemente checks out an aid to planning projects for the National Curriculum

ONE of the most time consuming tasks for teachers wondering how they will cover areas of the National Curriculum appropriate to their children is to identify which attainment targets describe the work they are planning and at what level. The Primary Integrated Project Planner – or P.I.P.P. – is designed to do much of this for you.

It is, essentially, a database containing the three core documents, Mathematics, English and Science. Additionally the Technology – including IT Capability – complete document and the History and Geography interim reports, to April 1990, are included.

When the program has been loaded a screen offers a choice of the projects you have already planned or the option to cancel. The latter allows you to begin a new project – and might better have been labelled as such.

Across the top of the screen are headings, each with a drop down menu. Figure I shows the available options .

Browse lets you step through the activities in a project you have already planned or through any available section of the National Curriculum, while Goto provides explicit information about what you want to see.

Search is probably the most powerful part of the package. Not only can you search for words and phrases in the National Curriculum, but you can search for anything you may have used in descriptions of the activities you intend to carry out with the children.

With Edit you can add, remove or alter your planned activities or statements of attainment from the National Curriculum. Your statement of activities can be fully edited, as can the attainment targets you hope to achieve.

You can also edit the wording of the attainment targets, which is especially important in the case of the interim reports.

With General you can load or save a project. It also allows you to remove a project from the disc and alter the speed of the mouse. I found that the default setting for the mouse (step 3) was rather fast. Exiting the program did not reset the mouse speed to its original setting.

Product: Primary Integrated Project Planner
Price: £39.95
Supplier: CIS, 8 Herbrand Street, London WC1N 1HZ
Tel: 071 883 4023

Help explains all the headings on the screen and Exit ensures that you have saved your edited work before leaving the program.

You can use and access the information in this package in a number of ways. It is assumed that you have decided on the sort of project that you wish to carry out with your children and that you have a broad idea of the levels of attainment reached by individuals in the class.

The next step might be to decide on the sorts of activities you want the children to experience. Just how you determine these will depend upon what you want the children to learn from their work.

You might begin by browsing through the Attainment Targets at an appropriate level which will begin to suggest the sorts of activities you might be able to carry out. Another approach might be to begin with activities which you already know and believe to be valuable.

You then look at the activities to see that you are covering the appropriate attainment targets and programs of study.

This is where the software becomes very helpful. It is possible to search the National Curriculum for references to words or phrases.

The program will then indicate the curriculum area, the attainment target, the level and the statement within that level that contains your word or phrase.

These can then be printed out, although the review version had this option disabled thus making it difficult to judge how useful the hard copy would be.

Eventually you reach a point where you enter the activities to be included in your project with a record of the attainment targets they will cover. This can then be used to print out a complete project plan for your work to be browsed through on screen.

Here they appear as the activity you have planned for the children occupying the top half of the screen with a list of up to 25 statements of attainment in the lower half.

Four options indicated by choice boxes at the bottom of the screen allow you to move to the next activity, the previous one, print the present one with a complete exposition of what the attainment targets contain or return to the main choices.

Clicking on any of the attainment target codes replaces the statement of activity with the actual statement of attainment. This can be a very useful way of comparing your intended activity with the intended learning.

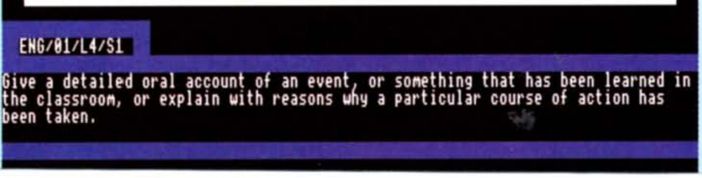
I found that the option to step through the statements often worked too quickly to control and it was all too easy to miss one

Summing up

While this program will take a little while to master, it has some very positive features. It is useful to be able to locate quickly and thoroughly the appropriate statements of attainment that match the work you are doing with your children.

I would ideally like to be able to access the programs of study and the non-statutory guidance in the same way. But at least when I have used the search facility with my key words and phrases I have a good idea where to look for the rest of the information and you can add the extra examples and other comments as you use the software.

I think this will be a package of considerable value to teachers.



```
ENG/01/L4/S1

Give a detailed oral account of an event, or something that has been learned in
the classroom, or explain with reasons why a particular course of action has
been taken.
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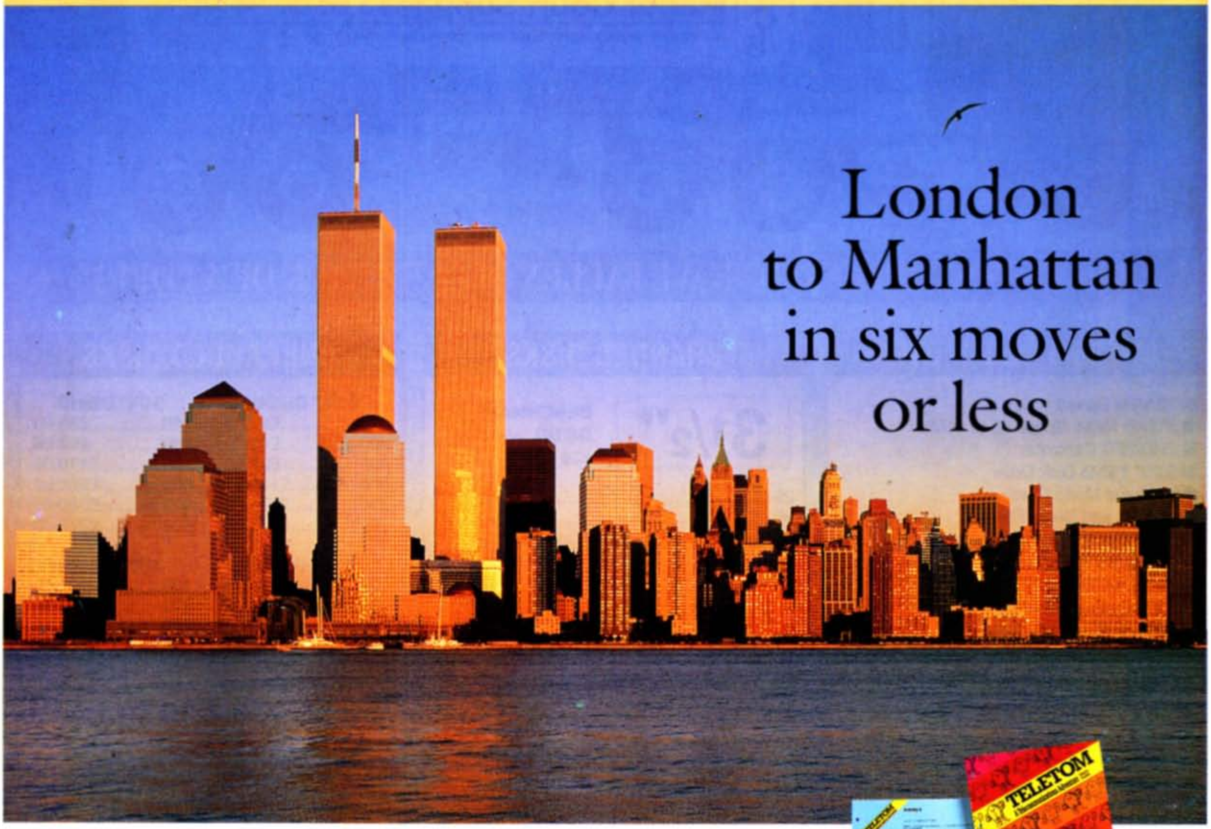
SECONDARY EDUCATION RESOURCES



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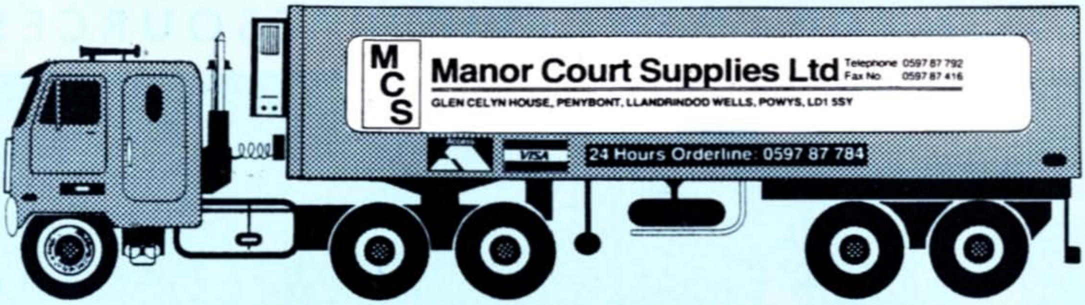
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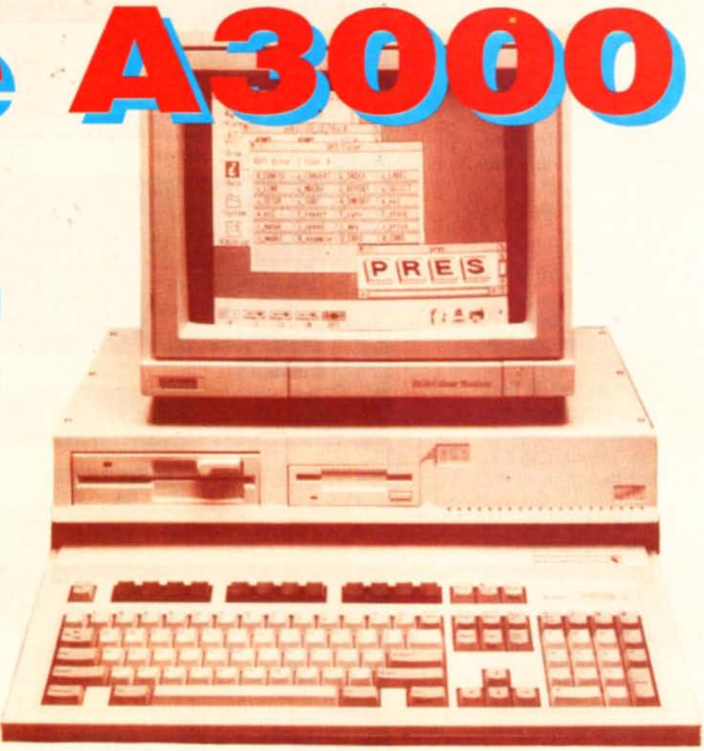
The A3000 is GO!

Stephen Wade takes a good look at a family of expansion units which allow the BBC A3000 to flex its muscles



WHEN the BBC A3000 finally arrived not much more than a year ago, one of the few early criticisms concerned the limitations imposed by the micro's design on its upgradability.

Most obvious was the positioning of the disc drive in the side of the machine, which caused problems with the design of items as simple as a bridging monitor stand.

Acorn solved this initial snag by developing a stand which perched on top of the micro – this was the one used in the publicity campaigns. But it did not get round the difficulty of introducing major upgrades involving second disc drives, hard drives and so on.

Because the micro boasted few ports, a single, slightly modified, podule slot and not much immediate scope for internal expansion – one podule and memory upgrades only – third party suppliers were left with an almighty problem.

First to the rescue came Surrey-based Pres with a family of expansion units making up a complete expandable system.

More drives

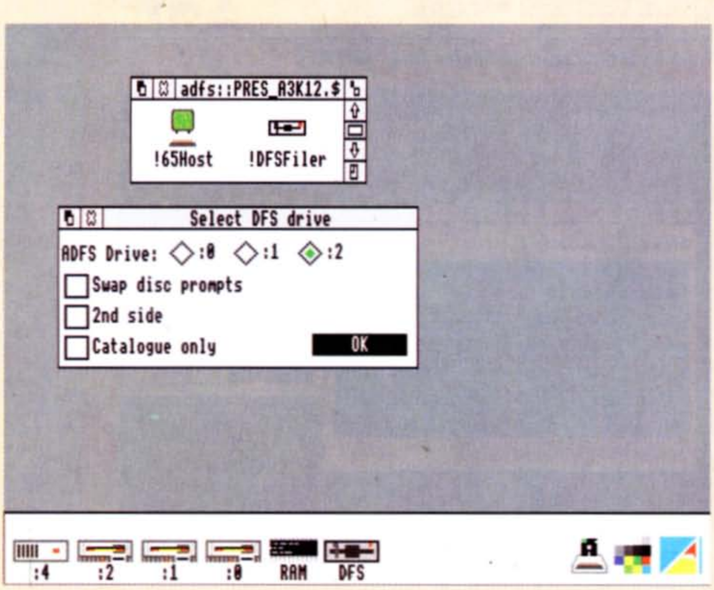
The unit begins with a monitor stand, the A3K1, which bridges the micro with its sturdy cantilever design, allowing access to the disc drive and reset button.

Next comes the main housing unit, the A3K2, which fits on top of the monitor stand. This unit is capable of taking two floppy drives and one hard drive, the possible combinations being:

- Single 3.5in drive.
- Single 5.25in drive.
- Two 3.5in drives.
- One 3.5in and one 5.25in drive.
- Any of the above with a hard drive.

The addition of second drives is possible thanks to a special disc buffer board, the A3K6, supplied on a podule fitted inside the A3000. This provides the circuitry needed to join the external system to the micro.

A rom upgrade, the A3K12, is available for addition to this podule which, along with a special 3.5in disc of driving software, provides 1770 DFS compatibility. Also on the



adfs::PRES_A3K12.$

!65Host !DFSFiler

Select DFS drive

ADFS Drive: ◇:0 ◇:1 ◈:2

☐ Swap disc prompts

☐ 2nd side

☐ Catalogue only

OK

Opting to read the files off the 5.25in DFS disc in drive 2 disc is an upgraded !65Host emulator which allows the use of 5.25in DFS floppies.

The 5.25in drive is of a fixed 80 track format, but the driving software can initialise a double stepping mode, thus emulating a 40 track drive. This works on a similar principle to the Master's *DRIVE command which allows 40 track discs to be read in an 80 track only unit.

Double-clicking on !DFSFiler in the DeskTop installs the utility on the left of the icon bar. Clicking there brings up a dialogue box where you set which drive contains the DFS disc – this means you can read 3.5in DFS discs as well.

When the DFS disc is read all its files are loaded into the micro's memory. From here they can be copied on to another floppy – 5.25in or 3.5in – so long as it is ADFS format, the hard disc or even the Ram disc.

A problem faced by BBC Micro owners with 5.25 in disc drives who want to upgrade to an A3000 is that of copying files from one format to the other.

Previously the process involved either going over an Econet system or linking up an A3000 or Archimedes and a BBC Micro directly, using specialist software for file transfers. Having the built-in disc drive simplifies the issue, the driving software making it all possible.

More space

The unit overlaps the back of the micro and so reveals more unused space - designed for other external adaptors.

Such a unit – the A3K3 available from Press – provides for the fitting of podules, a backplane and a special expansion board which can accomodate four mini cards.

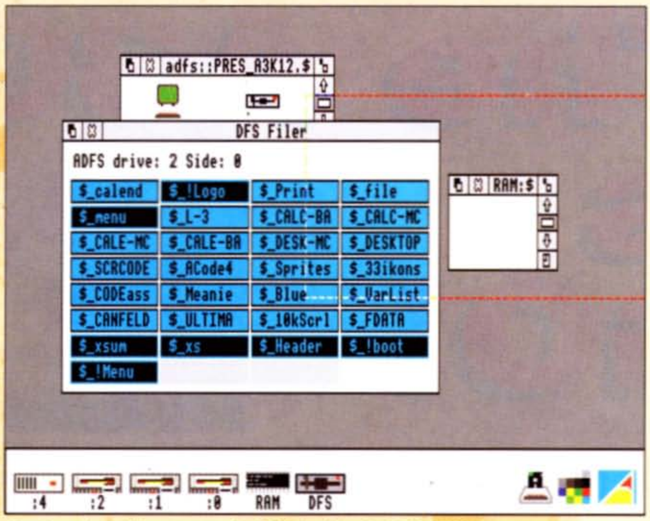
The main system housing uses only two two external leads – a power cable, and a ribbon which carries all data. Other units plug straight into the external podule slot on the rear of the micro, the expansion of these units being carried out within themselves.

By using this family of products you can easily transform your standard BBC A3000 into an even more powerful, enviable system at not too great a price.

Prices

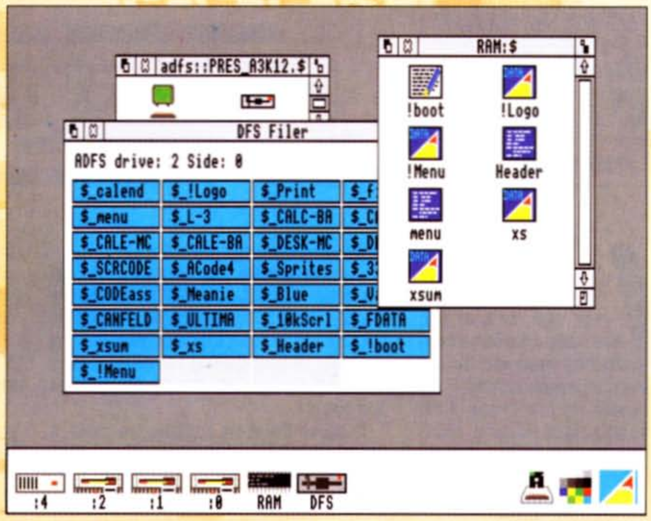
A3K1	Monitor stand	£24.95
A3K2	System housing unit	£69.50
A3K3	External podule case	£14.95
A3K6	Disc buffer podule	£48.95
A3K7	Hard disc upgrade	£429.50
A3K8	Addtional 3.5 in drive	£75.00
A3K9	Additonal 5.25 in drive	£99.95
A3K12	!65Host DFS and DFS filer	£19.95

Supplier: Pres Ltd., PO Box 319, Lightwater,
Surrey GU19 5PW.
Tel: 0276 72046


adfs::PRES_A3K12.$
DFS Filer
RAM:$
$_calend
$_!Logo
$_Print
$_file
$_menu
$_L-3
$_CALC-BA
$_CALC-MC
$_CALE-MC
$_CALE-BA
$_DESK-MC
$_DESKTOP
$_SCRCODE
$_ACode4
$_Sprites
$_33ikons
$_CODEass
$_Meanie
$_Blue
$_VarList
$_CANFELD
$_ULTIMA
$_10kScrl
$_FDATA
$_xsum
$_xs
$_Header
$_!boot
$_!Menu
:4
:2
:1
:0
RAM
DFS

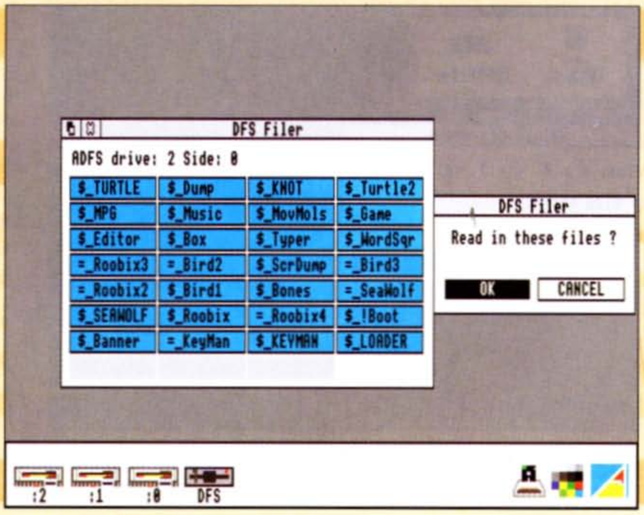
ADFS drive: 2 Side: 0

Copying selected files across to the RAM disc from the 5.25in DFS disc


adfs::PRES_A3K12.$
DFS Filer
RAM:$
!boot
!Logo
!Menu
Header
menu
xs
xsum
$_calend
$_!Logo
$_Print
$_menu
$_L-3
$_CALC-BA
$_CALE-MC
$_CALE-BA
$_DESK-MC
$_SCRCODE
$_ACode4
$_Sprites
$_CODEass
$_Meanie
$_Blue
$_CANFELD
$_ULTIMA
$_10kScrl
$_FDATA
$_xsum
$_xs
$_Header
$_!boot
$_!Menu
:4
:2
:1
:0
RAM
DFS

ADFS drive: 2 Side: 0

*The copied files now residing on the RAM disc, ready *SETTYPEd*


DFS Filer
$_TURTLE
$_Dump
$_KNOT
$_Turtle2
$_MPG
$_Music
$_MovMols
$_Game
$_Editor
$_Box
$_Typer
$_WordSqr
=_Roobix3
=_Bird2
$_ScrDump
=_Bird3
=_Roobix2
$_Bird1
$_Bones
=_SeaWolf
$_SEAWOLF
$_Roobix
=_Roobix4
$_!Boot
$_Banner
=_KeyMan
$_KEYMAN
$_LOADER
DFS Filer
OK
CANCEL
:2
:1
:0
DFS

ADFS drive: 2 Side: 0

Read in these files ?

Using the DFS filer to catalogue a disc

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VECTORS are the first type of graphics Basic programmers come across – the Basic DRAW command simply plots a line from one point to another. The result has a starting point and a direction – it's a vector.

Raster graphics are very different and deal with the colour of a particular pixel without any presumption about what's on the rest of the screen.

!Paint is the raster – sprite – editor on the Archimedes, while !Draw is the editor for 2D vector graphics.

!Draw has its own file format, and SYS commands are provided for experienced programmers to use the Draw Module. Unfortunately !Draw files are not designed to be read by humans.

This is unimportant if your application handles them for you, but is a drawback once you start to look underneath the surface.

Luckily !Draw also accepts an alternative file format which, unlike !Draw files, is widely used in various forms on a wide range of computers and has in many ways become the defacto lingua franca for much vector graphics. It is called DXF or Data Interchange Format.

DXF Files have their origins in the very popular professional graphics package AutoCAD – represented on the Archimedes by its junior, but nevertheless very serious, partner AutoSketch – and are intended to allow the transfer of vector graphic data between applications over a wide range of machines.

The success of the DXF format in doing this is impressive: It's a standard for building component data and also for mapping and presentation of finite element analysis grids.

Simplicity

Many applications can either read or write DXF files in some form or other. On the Archimedes series all of the following are, or will shortly be, able to handle DXF: AutoSketch, Euclid, WorraCAD, LinCAD and the Parametric Design Tool. Others are expected to follow.

Because DXF files can be read by humans, they are relatively easy to create and to follow. They may be modified or even merged in !Edit and the ready acceptability of DXF files on other computers provides portability.

There are, of course some problems. Not all applications have full implementations of DXF, and some have geometric primitives which differ but providing the original is not too ambitious, there should be little problem.

Euclid and PDT, for example, have requirements which limit the extent to which they are able to interpret the DXF format. Euclid is fully three dimensional and, if presented with a 2D DXF file, is forced to make an extrusion.

PDT stores information about the relationship between various objects. As this is absent in DXF files it can only plot the data given. Also there are differences between DXF and !Draw primitives, most of which can be overcome fairly readily. For example, it's much easier to use DXF for circles – unless, for circular arcs, you like using Bezier curves.

DXF is documented by AutoDesk, the suppliers of AutoCAD. Various other sources exist and can be tracked down in the computing sections of good bookshops. Acorn, unfortunately, has not documented its implementation of the DXF format as used in the current implementation of !Draw and it is necessary to experiment to find what works.

Fortunately a utilities disc called !works tools #1, based on this approach, is now available and provides sufficient information for you to create DXF files. There are example programs and library PROCs for a quick start.

Given this, it is only a short step to producing your own vector graphics in moveable, resizeable, multi-tasking windows. From there DXF files can be loaded into !Draw and thus directed to other applications such as Genesis or Desk Top Publishing packages.

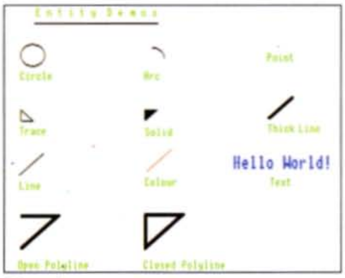


Figure I

The DXF format

DXF files are composed of up to four sections: Header, Tables, Blocks and Entities in that order. For the simplest picture, it is only necessary to consider the Entities section. Figure I illustrates the basic primitives available to DXF users on the Archimedes, as currently understood. These are familiar, possibly with the exception of polylines, traces and solids.

A polyline is a continous string of segments and is generally preferred over a trace which is rather more limited in scope, being restricted apparently to a maximum of three connected lines in !Draw. Solids are filled traces.

This simple collection of primitives very quickly allows the building up of fairly complex looking images – Figure II. Each example is built up from repeated use of just one type of entity.

Two dimensional representations of 3D objects are quite feasible in the normal way as examplified by Figure III. This was produced using Euclid to read a DXF file, to extrude and rotate the 2D object and finally to output a further DXF file – the image shown uses just line entities.

The next section is Blocks, which can be used to define an object comprised of entities with an assigned name. Each such block may be scaled as required and inserted into the resulting picture without undue repetition of data. This is especially helpful in certain cases as DXF files are inherently verbose and space reduction is useful.

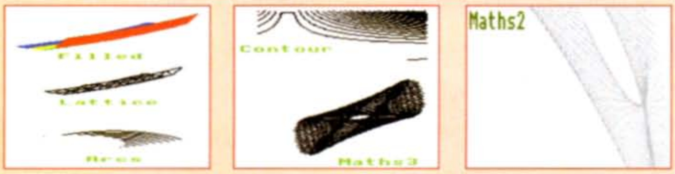


Figure II

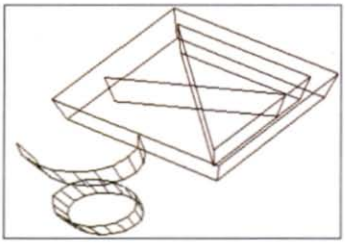


Figure III

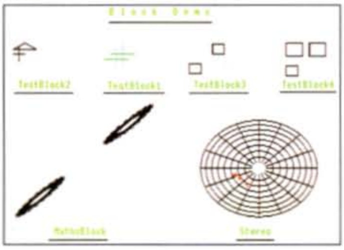


Figure IV

Examples where blocks are useful include libraries of map, electrical component and graphical symbols or outline fonts. Figure IV gives examples where blocks have been used to enable reproduction of some basic shapes, scaling being applied where required. In particular, note the repeated use of a block insert to define the data points on the polar projection.

A selection of further demos is included in Figure V which extend to simple graph plotting and also includes an extract from a map ported to the Archimedes using the DXF format.

One of the differences between !Draw

VECTOR GRAPHICS

Jim Markland delves into DXF, which opens the door to understanding !Draw files for humankind

and DXF files arises when filling objects – !Draw does have an advantage in this respect. It is appears necessary with DXF files to used solid objects or thickened lines. This method is shown in some of the examples.

Surprisingly !Draw does not appear to make thick circular arcs line up quite right and the edges of the thickened lines are not distinct – polylines filled using !Draw are one solution to this problem.

And next?

So we have pretty graphics in !Draw windows on the screen. What can we do with them? One answer is to export the files to a printer driver directly or, alternatively to a DTP package. Several Risc OS applications accept !Draw files and the options are numerous. An example of DXF vector graphics included in simple DTP is given in Figure VI.

There does appear to be one problem with the DXF reader in !Draw which for its solution seems to require a tables section. When a DXF file is loaded into !Draw, a window appears which asks for the scale required for the display – very useful – and also what font to use. Unless a suitably constructed tables section is used only the system font will result. This is, however of limited importance as the !Draw editor will correct this for you easily.

Vector images such as those shown here are not, of course, the be all and end all of computer graphics. Figure VII shows three images produced from an Archimedes contouring package – !Contour – on what is essentially the same data set.

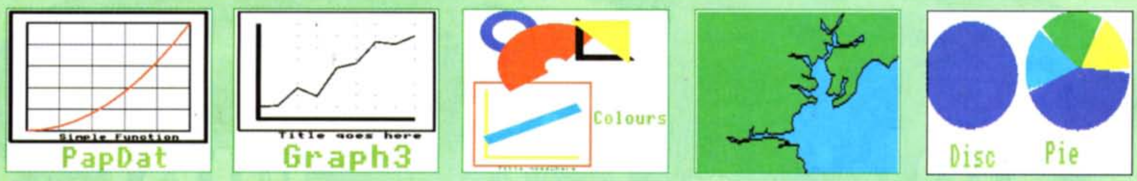


Figure V

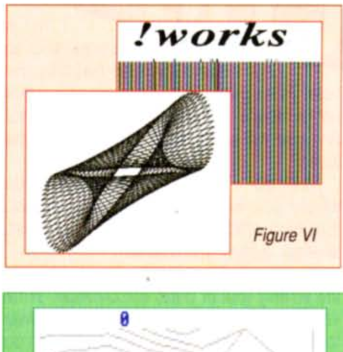


Figure VI

The three images are: Contours produced originally as a DXF file and imported to !Draw, the same contours grabbed as a sprite and painted. And finally the contour data rendered, rotated and lit in Euclid from an original Euclid file. Although not included here this could also be used as the starting point for ray tracing. The need to use a Euclid file format to produce the solid image highlights one important point – while DXF fully supports the third dimension, such a facility is not yet used in the Archimedes world.

Conclusion

There can be little doubt that DXF is of considerable practical value, offering files which, unlike those native to !Draw, can be read by humans, edited, written without the need for a programmer's reference manual and can be interchanged between computers.

Computer graphics is, however a rich subject in its own right and vector graphics is merely the starting point.

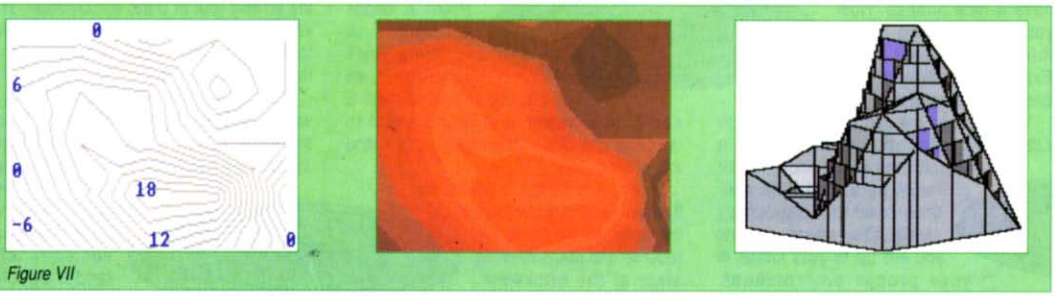


Figure VII

Of mice and men

This next section of Colin Jack's adventure **Oxbridge** involves cooperation from a feline friend. My own manic moggie has just planted muddy siamese pawmarks all over the top of my monitor, which suggests she is interested in catching the real thing rather than a computer game mouse.

From the Trophy Room you should now go East twice, Up twice and then West. Open the window and move N, N, S, S, E, D, D, W, N, N, N, E, E. Since the cat follows you for a limited number of moves only, it is essential to go directly to the lecture halls. Once you are there with the cat, the mouse is immobilised and you can take it.

Having got the mouse it's time for some quick exploration and a rapid raid on the laboratory area. Go N, N, W to the bulb and take it. This is a biology lab so what happens soon shouldn't come as too much of a surprise.

Continue E and N, take the box then go back S and E and open the fume cupboard. Retreat W for safety, then go back E and take the test tube. Now move W, S, W, W, W, S, S, S, S, S, S, S and drop the bulb into the cabbage patch.

Move away N to give it time to grow then return S and you'll find the bulb is now an orchid. Take it and carry on N, N, N, N, and W to the Trophy Room. Drop the orchid, box, test tube and mouse then save. You should now have 24 points.

You are going to leave the college soon – for which the magic words are *not* Open Sesame – and you are going to acquire some loot. This will require the exercise of both restraint and the old grey matter.

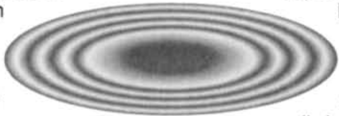
Off you go E, N, N, N, E, E, N, E, E, and S to the dining hall. Take the card and the decanter then go N, W, S, S, N, N and take the sundial. The only sundials I have ever seen are jolly heavy, so: Anabolic steroids anyone?

To get out of the college grounds you

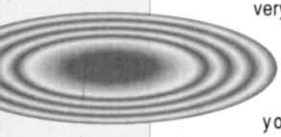
Sinking into crime

PART Two of *Dodgy Geezers* starts with you and your newly recruited gang in the dark alley. Tricks will have already left to organise the getaway car and you should have the cutters, pickaxe, matches, pills and book.

Move W into Terminal Street and *Cut fence* so that you can can proceed S where you will find a couple of Dobermanns approaching. *Drop pills* will enable the dogs to munch them and then have a nice snooze. Now you are free to go NW to the yard manager's hut. *Examine hut* followed by *Lift carpet* will reveal a manhole cover.



You will need the gang's help in order to *Lift cover* so that you can move down a very old and rusty ladder. *Light match* here, and then continue down to a disgustingly smelly, filthy sewer – at last you are up to your knees in your proper environment.

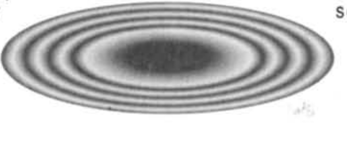


Quickly move W then *Take Lamp* and *Light Lamp* before the match goes out.

Now you can explore at leisure – well, almost – so move D and D to Inspection Point 7, Block 6, Drain 4. Go W and you will hear a plopping noise, go N to an unspeakably filthy sewer and then E to Inspection Point 7, Block 4, Drain 6.

Here you'll see a ladder, so climb U and U then E and N to a sewer that is too awful to describe in a family adventure game – and this column, too.

Soapy now ventures the opinion that you are directly under the bank, so he grabs the pickaxe and starts hacking away at the brickwork.



This enables you to see a grating beyond the hole. *Push grating* and keep repeating that until it opens. Up takes you into a corridor and you will see a vault, an office and the foyer.

First go N into the manager's office where you will notice a closed skylight. *Examine office* to reveal a filing cabinet, shelves, a chair and a desk.

If you now *Examine desk* you will learn the **wrong** (out of date) combination. What you should do instead is *Examine shelves* to discover a diary which is out of reach on the uppermost shelf.

Nothing daunted, you should make your way S, D, S, W, D, D, W, W and Up through the sewer system to a grating. *Open grating* and then go Up to the rear of the bank, then E and N to where some workman have most conveniently left a ladder enabling need to go S, W, W, W, N, N and SAY EXEAT – remember the hint from the pub troll? Continue N, N, W, W, W, E, N, W, W, and W to the service till. Safe acquisition here depends on brain power.

The numbers written on the blackboard in the maths lecture theatre had a missing term in the sequence. Throw the card, enter the missing number – I'm not telling at this stage – and take the wad of money. Avoid the bank manager's office if you want to stay alive.

Move off E, E, E, S, S, S, E, W, and N to the Fishmongers. Open the oyster and take the pearl before heading back home S, S, S, S, S, S, S, S, S, S, S, S and W to the Trophy Room. Drop the sundial (phew) decanter, wad of money and the pearl. Save once again with a score of 34.

(More next month)

you to climb Up and Up on to the roof of the bank.

Two moves east will take you to the closed skylight, so *Open skylight* and you'll find that – although the game doesn't tell you – you can now *Take diary* and thus *Read* it. Make a note of its contents and then *Replace diary, Close skylight* and make your way back W, W, D, D, S, W, D to the grating.

Close the grating and then continue D, E, E, U, U, E and N. *Take pickaxe* here then climb U and *Close grating* so that you should have left no trace whatever of your activities in the sewers or on the roof. This is vital if you are to complete the game successfully.

(To be concluded)

ELITE UPDATE

I have had a long and at times woeful letter from Tim Ellis. His first moan was that, although it says in the Commanders Flight Manual that Vipers will come and help you if you are attacked in the Safe Zone, he's never had an iota of aid.

Nor have I Tim, and what's more, I have been viciously attacked a number of times in spite of being allegedly Safe. Mind you, I've gone on to exact ferocious revenge before docking – the Vipers don't mind that, either. It just goes to show – you can't believe everything you read. This column excepted, of course.

Tim has also been picked on: Jumping from Beorsora to Artoresra, he found a spot of Krait bait and blasted it. Next moment he was surrounded by a horde of Kraits, Adders, Mambas and Sidewinders and before you could invoke your favourite invective he was torn to tatters.

Purely in the interests of research Tim loaded in the game again and had another go. Same thing, he was morsels of mincemeat in no time at all in spite of using his energy bomb.

I made a quick trip to the system myself – Galaxy 8 – but I confess that all I found was a reasonably active Anarchy system. It kept me busy, but no more than normal. Maybe something is triggered on a random basis. Still, if you fancy a scrap, Atoresra is worth a visit.

Last comment from Tim was a forlorn query about flying cities – he's seen none. Neither have I for that matter, and I wonder if Messrs Bell and Braben are fans of SF writer James Blish, since it was he who invented the notion of the spindizzy drive and spacefaring cities.

I have also received an absolutely massive missive from Daniel Doran which, if reproduced, would use up about two months' word allowance for the column. I love hearing from you but I nearly always have to condense what you tell me if I am to pass on the maximum amount of information to other readers.

Daniel encountered the C and D ship near Veorer in Galaxy Four. Daniel has a Master 128 version of **Elite** and is Deadly. He has a query which may help in detecting the C and D ship. What is the Condition status when it is near you? Is it still Green or Yellow – has anyone noticed?

Daniel asks because he has had a stalled jump-drive many times when fairly near to a planet and his status has been Green. I hope Daniel has realised that you can't jump close to a planet even when quite a way outside the Safe zone.

He also had a query about the planet Beorsara mentioned in the March column. As I've commented earlier, it's actually in Galaxy Eight and would appear to be part of an interesting area so far as combat goes Last two comments from Daniel: Has anyone reached the planet Soinsoan in Galaxy Seven? He reckons it is probably inaccessible. Finally, he recounts an adventure when he tailed an Anaconda a for about 20 minutes in an Anarchy system and managed to get it to release about 40 Worm class craft. As he says, they are easy pickings.

Daniel also included what looks like a very interesting listing, but I really need to have it on a disc – I can always send the disc back – so that I can check it out thoroughly. So Daniel if you can spare the time write again and include a disc.

Nick Rendall suggests some serpentine names for the C and D ship – and I confess that the one I liked best was *Kukri*. I'll try and include the Foztek Commander status listing next month since so many of you have asked for it – Nick sounds as if he's in dire need of something like it to give him encouragement.

He wonders if I have a copy of the game U.I.M. – I've been wondering about buying it, since it sounds like **Elite.** What do other readers think?

Commander Andy mentions a cheat for the Master Compact version of **Elite** – when you are asked to input a new commander, type *Joe-20*. I tried this on the BBC B and 6502 Second Processor versions and nothing happens there, so I can't verify the accuracy of this tip.

Ian Denton writes to say that our C and D ship is called a Cougar on the IBM PC version of the game, and that he thinks he's found a bug in the Master **Elite**. If you look at the short range chart while your Hyperspace count is decreasing and then switch to the front view all your fuel will be dumped on entry to the new system.

Again, I checked this out on my two versions and nothing untoward happened.

Something odd does happen to David Packer, who's living in Denmark at present. He has a Master 128 with a GEM 512 processor.

David, **Elite** won't work with the 512 processor working, the *only* second processor that Elite will work with is Acorn's own 6502 via the Tube.

As for your docking computer problem, try the method I invariably use. I keep on manual until I am lined up with the space station and then use the docking computer only to compensate for the space station's rotation.

If that doesn't work you've found a bug and I'm sure that Superior would exchange your version of Elite for one which works properly.

Until next month, happy voyaging.

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TAKE a letter, Miss Smith. Take a few more, then arrange them in a circle. What do I mean? Well, for a couple of years I've been envious of the special DTP effects that could be applied to text on machines such as the Macintosh, and wondered when Acornophiles would be given the same opportunities.

With FontFX we catch a glimpse of the capabilities of the Archimedes in this area.

!Impression started it all with !FontDraw, a utility which let you convert text to a Draw file so you could then manipulate it, but only by stretching and rotation. FontFX takes this a step further by enabling you to add a variety of effects before text is put into Draw format, rather than just setting it in a straight line.

The sorts of things you can do are place it in a circle, on a sloping line, an arc or a wavy line, with letters outlined and filled in different colours, and shadowed in one of two ways. The examples give you an idea of the range of effects, though some won't work with others for obvious reasons.

The instructions are supplied on disc and assume a basic knowledge of Risc OS and programming terminology. Even so, using the program is very simple, almost self-explanatory. There is no graphical interface, so you make your selections on a large dialogue box which the instructions call the control window.

When you have finished setting up your effect and have typed the text into the space provided, you use a Create File option to prepare the file and call up a save

Turning on to DTP

Bruce Goatly examines a book for those in earnest

Product: Into print
Price: £7.99
Supplier: BBC Books, Woodlands, 80 Wood Lane, London W12 0TT
Tel: 081-576 2538

YOU could tell that computing had really made it in the home when the BBC launched its Micro Live series all those years ago, giving the BBC Micro its seal of approval into the bargain.

The latest development, which implies that DTP has come of age, is a series on BBC TV called *Into Print.*

The book of the same name develops the themes in the programmes, subtitling itself *How to make desktop publishing work for you.*

The authors, Susan Quilliam and Ian Grove-Stephensen, who run their own publishing company with DTP, take as their premise that the new technology lets you do the whole job yourself or choose which parts you want to do and hand over the rest to professionals.

The book starts with your first ideas and decisions, leads you through document design, obtaining the words and pictures and presenting the text, outlines the range of technology that DTP can use, gives advice on document assembly, reproduction and distribution, and concludes with a brief look at future possibilities.

The authors place great emphasis on the need for design appropriate to the message and for the accurate communication of your ideas and needs to others. All the questions you should ask yourself, as well as the information you need to understand what those questions mean and why they should be addressed, are covered.

The importance of quality checking is stressed throughout – two minor DTP glitches on pages 142 and 153, where illustration frames have chopped off part of the text, were the only technical errors I found.

If anything, the range of topics could be daunting to someone unfamiliar with the printing world, but the authors use a clear and lively style to put their message across. The text is copiously illustrated with relevant examples – presented warts and all.

The book itself was produced by DTP methods, and has a distinctly modular feel, with the text frequently starting a new topic on a new page. A consequence is that some illustrations come across as mere padding – otherwise why show a diagram of how a laser printer works but not any other type of printer, which may be just as mysterious to the uninitiated? And the examples of proof marks are on the copy-preparation page, and vice versa.

The message becomes a bit disjointed as occasional well-intentioned profiles of people and companies appear on various pages within a chapter without being flagged by a different page design.

This mimics those TV documentaries that are interspersed with fragments of interviews, except that the idea works less well in print without other visual clues. Which brings us back to the importance of careful design.

It is disappointing that in a BBC book of 224 pages the Archimedes is allocated only half a page of text and one labelled and one anonymous illustration.

Although the vicious circle of small user base and software shortage is correctly stated, the description doesn't reflect the machine's development during the past nine months in both DTP software and hardware.

At the time of writing the transmission dates for the programmes were not known, so by the time you read this the series may have come and gone. Don't worry if you missed it – a repeat is inevitable, so catch it if you can.

Summing up

This book is not for the fainthearted or mere dabblers in DTP, but for anyone seriously interested in DTP it contains a wealth of ideas, information and sound advice, despite its almost complete neglect of the new BBC Micro, the BBC A3000.

on words

Tiring of straight text, Bruce Goatly decides to give it a whirl

box containing a Draw file icon.

The program is multitasking so, as with FontDraw, you can transfer the file direct to another suitable application like Draw or a DTP program – as long as your machine has enough memory to run both at once – or save it to disc.

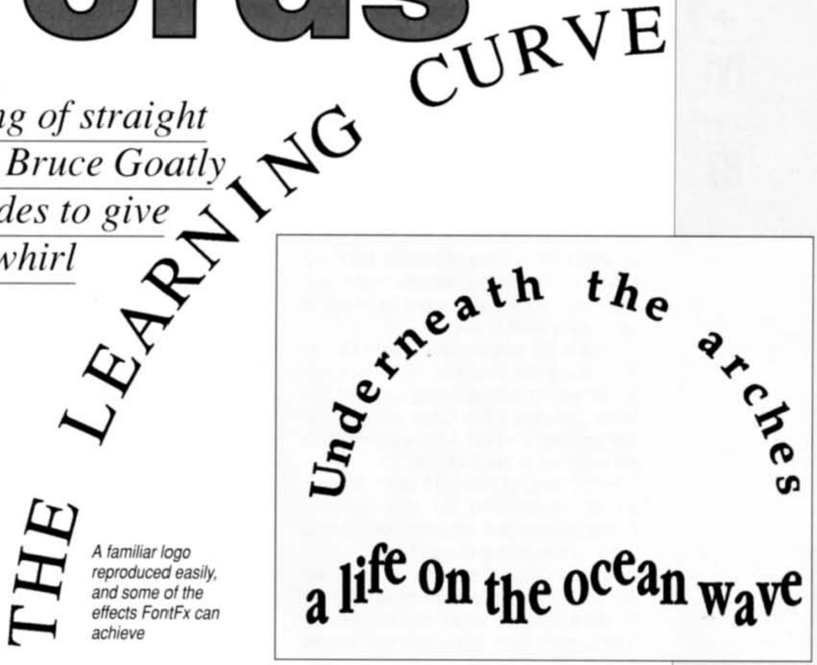
All, FontFX settings can be saved as script files, which are a textual representation that can be edited with a word processor. The procedure also works in reverse, giving the programming fraternity the ability to write script files containing both the text to be manipulated and instructions for the required effects, ready for loading into FontFX.

It is quite feasible to do batch processing of Draw files from one script, though I'm not sure why anyone should wish to do so when the program's control panel is so easy to use. Maybe it's to keep incorrigible coders happy.

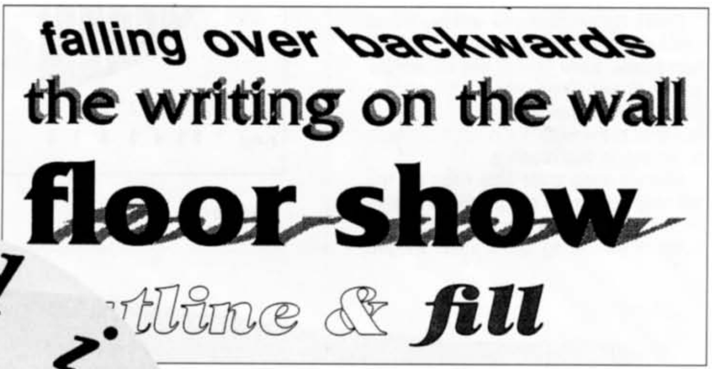
What it sets out to do, FontFX does well. Of course, some people are never satisfied, and there are still plenty of things that could be done. Setting text along a freehand curve – now there's a challenge...

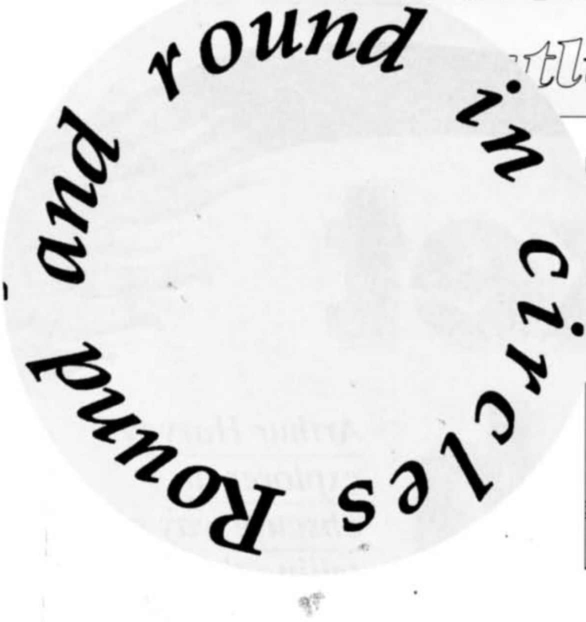
Summing up

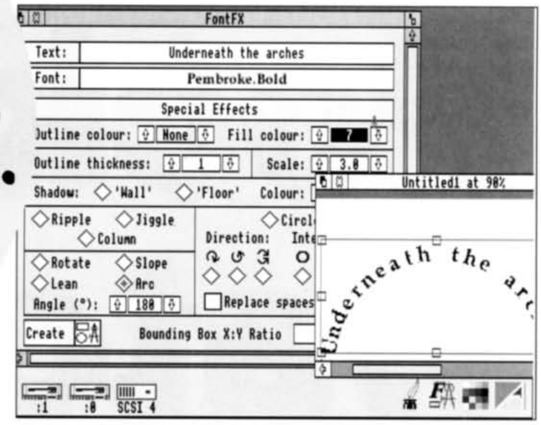
An invaluable and inexpensive aid to brighter DTP – rush out and buy it.


THE LEARNING CURVE
Underneath the arches
a life on the ocean wave

A familiar logo reproduced easily, and some of the effects FontFx can achieve


falling over backwards
the writing on the wall
floor show
tline & fill


Round and round in circles


FontFX
Untitled1 at 90%
Underneath the arc
:1
:0
SCSI 4

Text: Underneath the arches
Font: Pembroke.Bold
Special Effects
Outline colour: None Fill colour: 7
Outline thickness: 1 Scale: 3.0
Shadow: ◇'Wall' ◇'Floor' Colour:
◇Ripple ◇Jiggle ◇Circl
◇Column
Direction: Inte
◇Rotate ◇Slope
◇Lean ◈Arc
Angle (°): 180
☐Replace spaces
Create
Bounding Box X:Y Ratio

The FontFX dialogue box or control window

Pocket watch

Arthur Harvey explores an obscure way of telling the time

IN the June issue of *The Micro User* we calculated the angles needed to make a sundial. However, if you are travelling about, the standard sundial is not very convenient, especially if you don't know where North is.

Now back in the 17th century De Saint Rigaud came across this very problem and solved it rather neatly with a portable sundial often called the *Capuchin dial* from a supposed resemblance to the cowl of that religious order.

Come the 1990s, and science produces the Capuchin dial version two. True, it is a bit fiddly both to make and to use, but if you have a printer and a screen dump this program will at least draw the dial for whatever latitude you want to visit.

Type in the program and ensure it's correct using the checksums. It is worth remembering with a listing such as this which includes a few lower case letters, that pressing Shift with Caps Lock reverses the operation of the Shift key.

PROCdump at line 1410 gives the necessary command for the Watford Dumpout3 rom and should be changed to suit your own screen dump routine.

Run the program and after the title it will ask you for the latitude around which it will be used, a figure which can be gleaned from a good map. Enter it to the nearest degree, although parts of a degree may be added as a decimal.

Press Return and you will be asked whether it is for the Northern or Southern hemisphere. Enter N or S and the sundial will be drawn. Then press Y to obtain a printout. Check that the height of the dial is four fifths of the width. If it is not, there must be an error in your readings.

Now we come to the *Blue Peter* bit: You will need scissors, a sharp knife, a straight edge to cut along, a piece of card, about 30cm of thin string and a small weight. Glue the dial on to the card and cut round the outside line.

With the sharp knife make a cut along the dotted line from A to B in Figure I and cut out a narrow slit at C-D exactly in line with the Sun Line. Make a short cut on the dotted line at E and another at F.

Turn the card over, and lining up your straight edge with these cuts, score down the card, that is make a shallow cut so that it will bend easily.

Next take the string and tie a knot, or perhaps fix a small bead, about one third of the way along it. Fix the weight to the shorter end. This should be heavy enough to keep the string straight when you hold up the other end. Pass this end through the slot A-B so that the string hangs down over the dial.

To prepare the dial, move the string so that it passes through the slot at the month and approximately the date at which you will be using it.

That is if it were the 11th of the month the string would pass through the slot at about a third of the way through the month, as shown in Figure II. Note that June and December change direction on the scale on the 21st of the month.

Without moving its position, pull the string through the slot so that the knot is over the 12 o'clock mark at the left of the scale and ensure the string does not move, perhaps

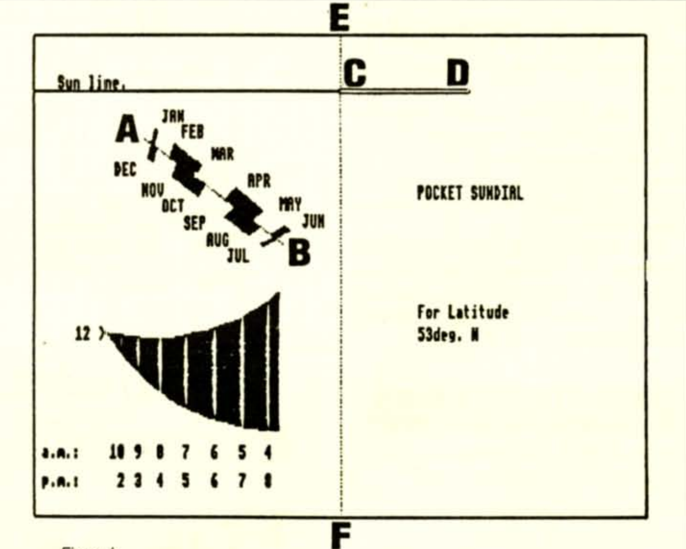


Figure I:

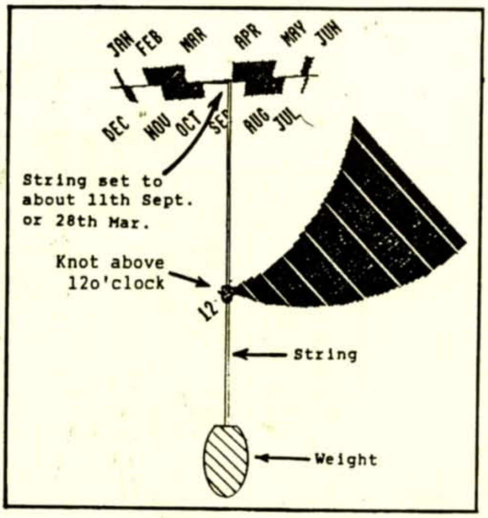


Figure II:

with some sticky tape on the back. Fold the side over and your sundial is ready.

To use it you have to wait for a sunny day then open the card at right angles and, holding it vertically, turn it so that the sun shines through the slit on to the card. Tilt it so that the bright line is exactly over the Sun Line. Check that the string is just hanging free of the card and the knot will indicate the time against the scale, either am or pm.

If you are so lost that you do not know whether it is before or after noon, wait about 15 minutes and read it again. If it has moved to the left it is morning, or if to the right it is afternoon. As there is not much room round the 11/1 o'clock line the figures 11 and 1 have been left off for clarity's sake.

Although of not much practical use, this is an intriguing sundial. The basic dial is constructed as shown in Figure III.

The position of the months correspond to the sun's declination. As the sun is higher in the summer months, in the North June is at the bottom, while in the South it is at the top so that the scale must be reversed. In the tropics, between 23.5 N and 23.5 S, the month scale would "fold" over on itself which makes it difficult to see, so this has not been implemented and those angles have been disallowed.

Of course the same restrictions apply to this sundial as were mentioned in the previous article. The time shown will be local time, which is different from G.M.T. by one hour for every 15 degrees of longitude that you are from the Greenwich meridian, slower to the West and faster to the East.

● *So there you are. The next sunny day someone asks you the time, bring out your pocket sundial and watch their faces!*

➤

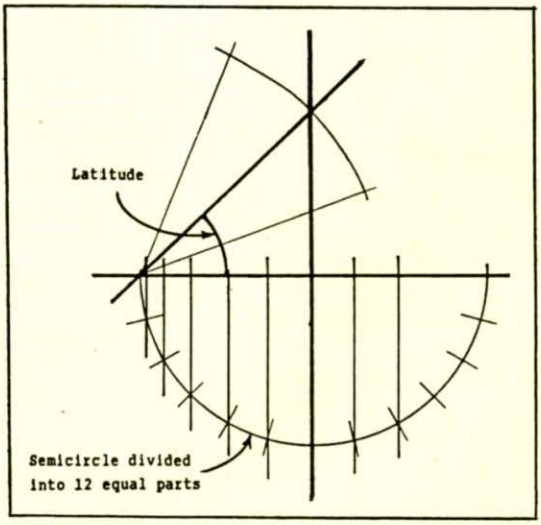


Figure III:

MAIN VARIABLES

L	Latitude
N$	Indicates N or S
M,b	X,Y co-ordinates of graphics origin
H	Length from origin to month scale
D	Angle of declination of the sun
M$	Month
x,y,h	Co-ordinates calculated by PROCtriangle

PROCEDURES

title	Draws the title page
start	Sets the initial conditions
dial	Draws the dial
triangle	Calculates some co-ordinates
circle	Draws the hour dial
draw	Draws the month dial
hours	Adds the hour lines and nos.
months	Adds the months
frame	Draws the outline
dump	Screen dump to printer
key	Waits for keypress
error	Reports errors

```
   10 REM POCKET SUNDIAL
   20 REM by Arthur Harvey
   30 REM (c) The Micro User
   40 ON ERROR PROCerror
   50 MODE1
   60 PROCtitle
   70 REPEAT PROCstart
   80 PROCdial:PROChours
   90 PROCmonths:PROCframe
  100 MOVE800,350:PRINT"Print? (Y/N):"
  110 PROCkey
  120 IF G$="Y" GCOL4,1:MOVE800,350:PRIN
T"Print? (Y/N):":PROCdump
  130 RESTORE:UNTIL FALSE
  140 :
  150 DEF PROCtitle
  160 VDU29,500;0;19,3,6;0;
  170 GCOL0,129:GCOL0,3:CLG
  180 L=.8:M=500:N$="N"
  190 PROCdial:VDU28,0,31,8,0
  200 COLOUR131:COLOUR1:CLS
  210 PRINTTAB(0,8)"A POCKET SUNDIAL. by
 ArthurHarvey."
  220 PRINT'"A curious Sundial,but when
assembled it does show the time !"
  230 MOVE600,900:DRAW600,920
  240 GCOL0,2:Y=0
  250 FOR X=600 TO -100 STEP-2
  260 PLOT85,X,900+Y:Y=20-Y:NEXT
  270 PRINT'"Press any key..."
  280 PROCkey:ENDPROC
  290 :
  300 DEF PROCstart:VDU22,1
  310 INPUTTAB(0,8)"For use near Latitud
e (23.5-90) :"L
  320 IF L<23.5 OR L>90 VDU7:GOTO310
  330 PRINTTAB(0,12)"Which hemisphere ?
(N/S)":N$=GET$
  340 IF INSTR("NS",N$)=0 VDU7:PRINT"N o
r S ?":GOTO330
  350 L=RAD(L):M=150
  360 VDU22,0,29,M;0;:VDU5:ENDPROC
  370 :
  380 DEF PROCdial
  390 IF 300*TANL>300 H=300/SINL ELSE H=
300/COSL
  400 X=H*COSL:b=700-(500*L/1.5)
  410 VDU24,-M;0;1.6*X;800;
  420 PROCtriangle(.41)
  430 PROCcircle(h,x,y,-1)
  440 PROCtriangle(-.41)
  450 PROCcircle(h,x,y,1)
  460 FOR K=1 TO 8:k=RAD(K*15)
  470 x=X-X*COSk:MOVEx,0:PLOT7,x,800
  480 NEXT
  490 VDU26,29,M;0;:H=H+30:RESTORE
  500 PROCdraw:PROCdraw:H=H+30
  510 PROCtriangle(.45):MOVEx,y
  520 PROCtriangle(-.45):PLOT21,x,y
  530 ENDPROC
  540 :
  550 DEF PROChours:GCOL4,1
  560 MOVE-M,150:PRINT" a.m.:"
  570 MOVE-M,90:PRINT" p.m.:"
  580 MOVE-64,b+12:PRINT"12 >"
  590 FOR K=2TO8:k=RAD(K*15):x=X-X*COSk
  600 IFK<3MOVEx-24,150 ELSE MOVEx-8,150
```

Get it right ✓

```
  10 =    0 0     260 = 4A58 2     510 = 74AB 7
  20 =    0 0     270 = 5E6B E     520 = 57BD 5
  30 =    0 0     280 = 4B80 2     530 = ED0F 7     760 = A6F6 0      990 = 9719 3
  40 = 9621 1     290 = 9719 D     540 = 9719 6     770 = AE15 D     1000 = 8C69 5
  50 = EA3A 4     300 = F21B C     550 = 2DB5 4     780 = FF8F 3     1010 = 3278 C
  60 = 5255 6     310 = 6765 E     560 = F83A 7     790 = 6D40 A     1020 = 3690 6
  70 = F69A 7     320 = 922E 5     570 = CAA5 9     800 = 4687 E     1030 = 25E5 1
  80 = 43C6 9     330 = E43C 1     580 = 87EA C     810 = ED0F D     1040 = 15EA 1
  90 =  D83 5     340 = 1EF0 3     590 = 7C40 8     820 = 9719 5     1050 = A629 4
 100 = 1F91 E     350 = 16D5 D     600 = 7E19 6     830 = 593C 9     1060 = A7BD C
 110 =  2DE 8     360 = 8482 F     610 = 4116 C     840 = FF60 D     1070 = 1452 8
 120 = 4920 9     370 = 9719 A     620 = E531 0     850 = ED0F D     1080 = 9719 9
 130 = 3EAC 1     380 = E651 C     630 = 9719 3     860 = 9719 F     1090 = 4683 6
 140 = 9719 8     390 = C12D 2     640 = D93A D     870 = B1B4 4     1100 = 159A D
 150 = 5C22 4     400 = 1A59 0     650 = 328D A     880 = 9FA0 9     1110 = ED0F 3
 160 = 864F 0     410 = AC7D F     660 = 36A6 6     890 = 89ED 1     1120 = 9719 E
 170 = 664A F     420 = BE67 4     670 = 9612 2     900 = 220F 2     1130 = 8564 5
 180 = 518B B     430 =   E1 C     680 = C175 7     910 = 52B6 F     1140 = 20E7 C
 190 = 60B7 E     440 = 68AA D     690 = E531 C     920 = AA27 B     1150 = 9719 C
 200 = 5331 8     450 = 312F 1     700 = 9719 3     930 = DC5A B     1160 = EA24 C
 210 = 1585 A     460 = 1008 D     710 = 5A71 1     940 = D79F 6     1170 = FA32 0
 220 = 4FE1 5     470 = 9D25 F     720 =  571 E     950 = B723 3     1180 = 9719 7
 230 = 3460 0     480 = 2C83 E     730 =  DF6 F     960 = FE50 D     1190 = D55D 5
 240 = 1E7E 0     490 = F884 B     740 = C705 5     970 = A7ED E     1200 =  FEB D
 250 = BA90 C     500 =  FE0 1     750 = 2D0B 0     980 = 322C B
```

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```
  610 PRINT;12-K:MOVEx-8,90:PRINT;K
  620 NEXT:ENDPROC
  630 :
  640 DEF PROCmonths:RESTORE
  650 H=H+70:S=.05:FOR K=1 TO 17
  660 READ D,M$:IF N$="S" D=-D-S
  670 PROCtriangle(D):MOVEx,y:PRINT M$
  680 IF K=8 H=H-150:S=.2
  690 NEXT:ENDPROC
  700 :
  710 DEF PROCframe:VDU26
  720 MOVE0,0:DRAW0,1023:DRAW1279,1023:D
RAW1279,0:DRAW0,0
  730 MOVE0,900:DRAW640,900
  740 MOVE640,905:PLOT21,900,905
  750 PLOT21,900,895:PLOT21,640,895
  760 MOVE640,1023:PLOT21,640,0
  770 MOVE800,700:PRINT"POCKET SUNDIAL"
  780 MOVE800,450:PRINT"For Latitude"
  790 MOVE800,400:PRINT;DEG(L);"deg. ";N
$
  800 MOVE50,935:PRINT"Sun line."
  810 ENDPROC
  820 :
  830 DEF PROCtriangle(D):h=H/COSD
  840 x=h*COS(L-D):y=h*SIN(L-D)+b
  850 ENDPROC
  860 :
  870 DEF PROCcircle(R,Xc,Yc,P)
  880 Ct=COS(L+.41*P)
  890 St=SIN(L+.41*P)
  900 Cp=1:Sp=0
  910 MOVEXc-R*Ct,Yc-R*St
  920 FOR A=1 TO 18
  930 CA=Cp*.985-Sp*.174
  940 SA=Sp*.985+Cp*.174
  950 x=Xc-R*(Ct*CA-St*SA)
  960 y=Yc-R*(St*CA+Ct*SA)
  970 MOVEXc,Yc:PLOT86+P,x,y
  980 Cp=CA:Sp=SA:NEXT:ENDPROC
  990 :
 1000 DEF PROCdraw:MOVE0,b
 1010 FOR K=1 TO 4:FOR J=1 TO 2
 1020 READ D,M$:IF N$="S" D=-D
 1030 PROCtriangle(D):DRAWx,y:NEXT
 1040 PLOT85,0,b:NEXT
 1050 H=H-30:PROCtriangle(-.45)
 1060 DRAWx,y:PROCtriangle(.45)
 1070 PLOT87,x,y:ENDPROC
 1080 :
 1090 DEF PROCdump
 1100 *GIMAGE EPS V&EF
 1110 ENDPROC
 1120 :
 1130 DEF PROCkey:*FX15
 1140 VDU7:G$=GET$:ENDPROC
 1150 :
 1160 DEF PROCerror:VDU3:IFERR=17GOTO70
 1170 REPORT:PRINT" at line ";ERL:END
 1180 :
 1190 DATA-.41, ,-.4,JAN,-.3,FEB,-.13,MA
R,.08,APR,.26,MAY,.38,JUN,.41,
 1200 DATA.41, ,.4, ,.31,JUL,.14,AUG,-.0
6,SEP,-.25,OCT,-.38, ,-.41,NOV,-.6,DEC
```

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On platform 1...

Hac Man has ways of making it easier for you to win

Power pills

- Hoverbod passwords and built-in cheats
- Ricochet passwords
- Clogger bug/cheat
- Arcade Soccer snag solved
- FireTrack infinite lives
- Zalaga hi-score changes plus lotsa lives
- Cylon Attack level jump

WELCOME to another column, one that will be of special interest to fans of shoot-'em-ups and platform games. One major advantage of powerful modern computers with their superb graphic facilities is that humanoid characters can be made much more realistic, nasties even nastier and cute characters incredibly so. And one character that falls into this last category is Minerva's *Hoverbod*.

Although this Archimedes offering is basically a platform game, its delightful graphics, coupled with an elementary degree of arcade-adventure, give it a certain appeal.

The full set of passwords for the eight screens of Hoverbod, courtesy of 10-year-old Max Kolombos of Lower Langford, near Bristol, is shown here.

1	<SPACE BAR>
2	MINERVAS
3	SIRBARRY
4	ZOTYBLOB
5	FLUMPIES
6	SQUIDGEE
7	WOBBLIES
8	POSSKETT

A couple of cheat facilities are built into the game. To freeze all monsters on the current screen hold down both Shift keys and the slash key (/) on the keypad. This works fine, but the animated nasties will all be moving once again if you return to this screen.

To jump straight to the last section of the game – the Castle of Gribb, according to the instructions – press the spacebar to start the game as usual, then hold down both Shift keys and the asterisk key. The disc drive will start up and after a few seconds a screen similar to the original title page will appear, but this time sporting the message *Hoverbod and his quest for wings* instead of the more familiar *Hoverbod and the Ibby Squibblies*.

Pressing Shift+Shift+Slash no longer has the effect of freezing the monsters, instead it activates a spray can.

Happy hovering!

What a hero...

Without trying to blow my own trumpet over loudly, I have had a hand in quite a few BBC Micro and Electron games over the years.

One was the Master-compatible version of Orlando's classic shoot-'em-up Zalaga, which was featured on Play It Again Sam 10.

When I received my complementary copy of Sam 10 I noticed that the high-score table on the Master version of Zalaga was mine, but that the names had been blanked out.

"What?" I thought, "No signature?" To right this dastardly wrong I have written this listing for the 5.25in disc version of Sam 10, which allows you to modify Zalaga's built-in high score table so that your own high scores appear when the game is run.

Simply change the scores and names in lines 210 to 300 to something more appropriate. Note that both the scores and the names are poked directly into the game code, so take care not to change the lengths of either or you may run into serious problems.

Of course no game modification routine would be complete without infinite and extra lives pokes, so I have thrown these in for good measure. Incidentally, I would be the first to admit that my own top score is nothing to write home about, but then I have never claimed to be a card-carrying Zalagan hero!

```
 10 REM Zalaga infinite/extra lives
 20 REM and high-score table editor
 30 REM Play It Again Sam 10 5.25"
disc version
 40 REM by Hac-Man 1990
 50 REM (C) The Micro User
 60 REM
 70 IF PAGE=&7000 GOTO 120
 80 FOR I%=0 TO (TOP-PAGE) STEP 4:I
%!&7000=I%!PAGE:NEXT
 90 *KEY0 PAGE=&7000|MEND|MOLD|MRUN
|F|M
100 VDU 21:*FX 138,0,128
110 END
120 MODE 7:*FX 15,0
130 PRINT "Please insert Sam 11 dis
c and press any key...";
140 G%=GET:PRINT
150 A%=0:X%=255:T%=USR(&FFF4):T%=(T
% DIV &100)AND 7
160 IF T%>2 THEN *RUN 2ZALAGA
170 IF T%<3 THEN *LOAD ZALAGA!
180 ?&3064=&B5:?&31BE=&B5:?&359C=&B
5:REM infinite lives
190 ?&301B=4:REM number of lives _
4 is default
200 CLEAR:DIM N$(10),S(10)
210 S(1)=&0078150:N$(1)=" Hac-Man's
 finest hour "
220 S(2)=&0024430:N$(2)="   Alix
"
230 S(3)=&0008000:N$(3)=" Orlando M
. Pilchard "
240 S(4)=&0007000:N$(4)="==========
==============="
250 S(5)=&0006000:N$(5)=" Aardvark
Software "
260 S(6)=&0005000:N$(6)=" Superior/
Acornsoft. "
270 S(7)=&0004000:N$(7)=" Aardvark
Software "
280 S(8)=&0003000:N$(8)=" Superior/
Acornsoft. "
290 S(9)=&0002000:N$(9)=" Aardvark
Software "
300 S(10)=&0001000:N$(10)=" Superio
r/Acornsoft. "
310 PROCtable
320 IF T%>2 THEN *KEY0 PAGE=&2500|M
 END|M OLD|M RUN|F|M
330 IF T%<3 THEN *KEY0 PAGE=&1900|M
 END|M OLD|M RUN|F|M
340 VDU 21:*FX 138,0,128
350 END
360 DEFPROCtable
370 FOR X=1 TO 10
380 IF T%>2 THEN N=X*25+&5B48 ELSE
N=X*25+&5B54
390 $N=LEFT$(N$(X),25)
400 S1=S(X) DIV &100000:S2=S(X) DIV
 &1000 MOD &100
410 S3=S(X) DIV &10 MOD &100
420 IF T%>2 THEN H=X+&5C79 ELSE H=X
+&5C86
430 ?H=S3:?(H+10)=S2:?(H+20)=S1
440 NEXT
450 ENDPROC
```

Killing time

Orlando's **FireTrack** was, and still is for many players, the ultimate shoot-'em-up. It starts off easily enough for even the most inexperienced to get going, but progresses to a level of difficulty sufficient to push the limits of even the most battle-hardened arcade addict.

A level jump facility allows you to try your hand at any of the first three levels; but here's help for any frustrated player who cannot reach the seventh. It comes in the form of an infinite lives poke supplied by Christian Clarke of Twickenham, Middx.

If you own either the tape or 5.25in disc version of Play It Again Sam 7, enter the following listing, save it on to one of your own blank tapes or discs, type RUN and follow the on-screen instructions. Thank you, Christian.

```
 10 REM FireTrack infinite lives
 20 REM for Play It Again Sam 7 tap
e and 5.25in disc versions
 30 REM by Christian Clarke 1990
 40 REM (C) The Micro User
 50 REM
 60 MODE 7
 70 osargs=&FFDA:A%=0:X%=&70:Y%=0:F
%=USR(osargs) AND &FF
 80 IF F%=1 THEN PROCtape ELSE IF F
%=4 THEN PROCdisc
 90 PRINT:CALL &120
100 END
110 REM
120 DEFPROCtape
130 !&120=&208D68A9:!&124=&8D01A902
140 !&128=&0EA90221:!&12C=&00A004A2
150 !&130=&A2FFF420:!&134=&2001A05E
160 !&138=&4CA9FFF7:!&13C=&A92A458D
170 !&140=&2A468D4F:!&144=&478D2EA9
180 !&148=&1F00202A:!&14C=&338DEAA9
190 !&150=&23348D23:!&154=&04A20DA9
200 !&158=&4CFFF420:!&15C=&2E4C479F
210 !&160=&4C544621:!&164=&0D64616F
220 !&168=&488A4808:!&16C=&CAAD4898
230 !&170=&8DFE2903:!&174=&A86803CA
240 !&178=&2868AA68:!&17C=&000D4460
250 PRINT "Please insert FireTrack
tape and press any key...";:A%=GET:
PRINT
260 ENDPROC
270
280 DEFPROCdisc
290 !&120=&00A281A9:!&124=&F420FFA0
300 !&128=&F0FDE0FF:!&12C=&A06BA20A
310 !&130=&FFF72001:!&134=&A2013E4C
320 !&138=&2001A075:!&13C=&60A9FFF7
330 !&140=&2004998D:!&144=&4CA90400
340 !&148=&A92A258D:!&14C=&2A268D4F
350 !&150=&278D2EA9:!&154=&8DEAA92A
360 !&158=&9B8D2098:!&15C=&1F322020
370 !&160=&338DEAA9:!&164=&23348D23
380 !&168=&4C04924C:!&16C=&5446212E
390 !&170=&44414F4C:!&174=&212E4C0D
400 !&178=&4C53414D:!&17C=&000D444F
410 PRINT "Please insert FireTrack
disc and press any key...";:A%=GET
420 ENDPROC
```

'Ere we don't, 'ere we don't, 'ere we don't...

Mr G. Thompson of Leeds recently encountered a problem when he tried to run the Fourth Dimension's **Arcade Soccer** on his system – a BBC B with a Solidisk 1770 DFS and assorted sideways roms.

He found that the disc would not boot reliably, often terminating with the message Bad program. He tried a second copy of the game but the result was the same. Even removing all the roms made no difference.

Eventually, Mr Thompson discovered that the culprit was the Solidisk DFS itself, but that if he typed in:

```
*MASKOFF
*EXEC !BOOT
```

the game loads perfectly.

I checked my own copy of Arcade Soccer on a friend's machine fitted with this DFS, and I could not find anything wrong. Not once did it fail to boot for me – nevertheless, I'm sure that this tip will be a winner for anyone else in the same boat.

A-Clogging we shall go

Jason Stone of Reading, Berks, has a tip invaluable to any reader battling against the clock on Impact Software's **Clogger**, a preview version of which appeared as a freebie on the cover of the December 1988 issue of *The Micro User*.

If you are running short of time and your supply of cakes is somewhat depleted, press P to display the picture of the completed screen, then when the displayed time is about halfway through the last second, press the spacebar. If the game does not end you have been successful. Next press S for the status screen, and your remaining time should be about 99:57.

For the next few minutes you must be careful about your cake consumption, otherwise you may go "round the clock" and have to run through this procedure again.

Nevertheless, it's a useful tip which allows players other than the speed merchants to stand a chance on the more difficult screens. Thank you Jason.

Pass Friend

Next up is another set of passwords, this time from Mark Sharpe of St. Albans, Herts. They are for the five levels of Superior's **Ricochet** and go like this:

1	(Fortress)	none
2	(Techlev)	ENIGMATIC
3	(Derelict)	SPIRITUAL
4	(UFO)	SUPERNOVA
5	(Ancient)	CIRCUITRY

Thank you Mark.

Killing time

While on the subject of shoot-'em-ups, one excellent game which has given me many hours of enjoyment over the years is A+F's **Cylon Attack**. Although A+F itself has long since gone, every BBC Micro owner who was there at the beginning will have fond memories of Cylon Attack and the company's other star game, Chuckie Egg.

Although newcomers to Cylon Attack may view it as a poor man's Elite, Cylon actually preceded Bell and Braben's classic by a year or so. Perhaps Elite, therefore, is a rich man's Cylon Attack...

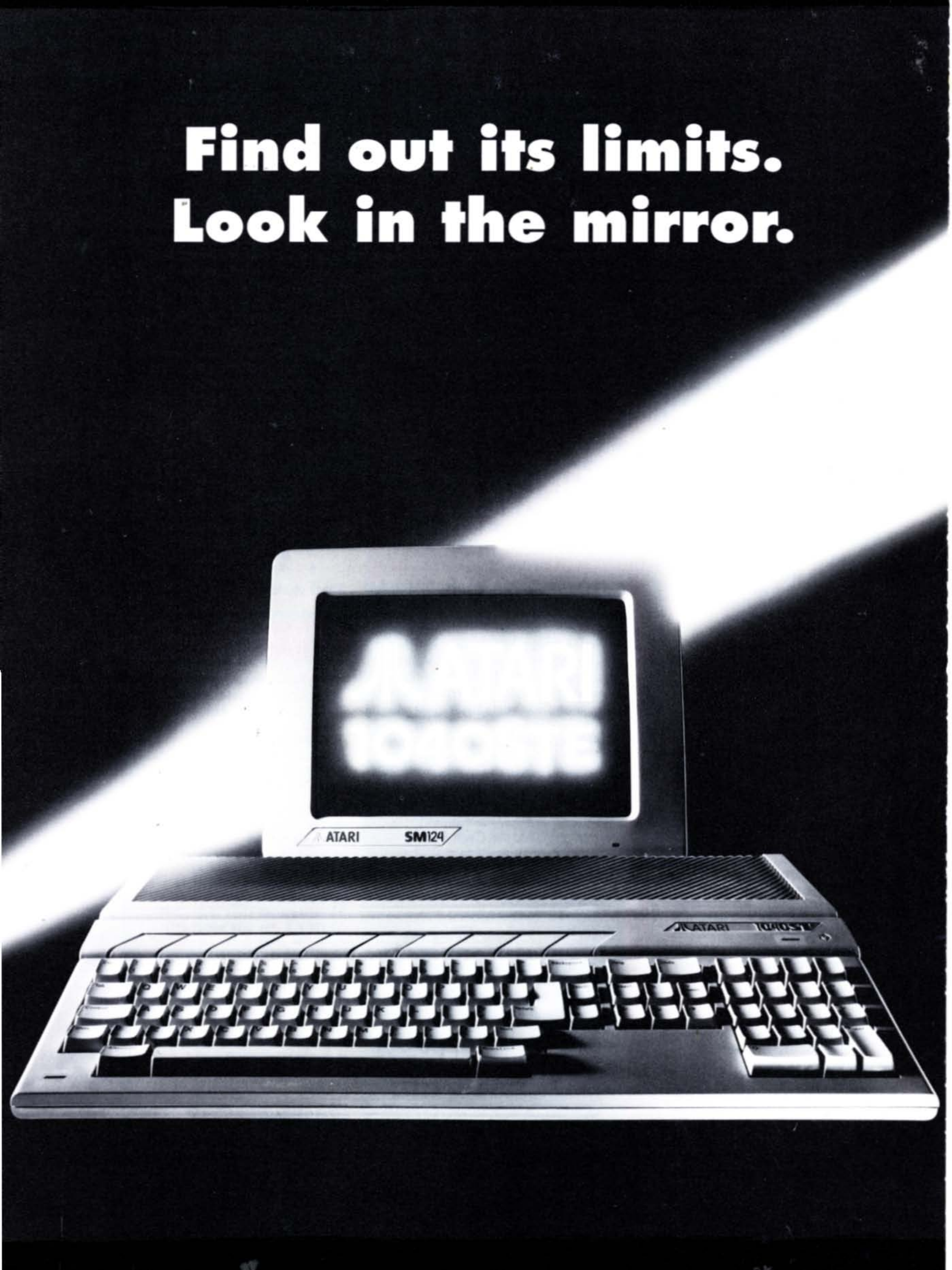
Elite is undoubtedly a mega-game, but for me it is the fact that Cylon Attack does not pretend to be anything more than a straightforward shoot-'em-up that gives the older game its appeal.

The only criticism I would level at it – and also at its contemporary, Chuckie Egg – is that once you reach a certain level of skill a single game can take hours. Indeed, I used to reckon that a game of Cylons would take me about two and a half hours. Unfortunately, unlike Elite, there is no save facility, only a pause.

One feature othat used to frustrate me was the fact that the game did not start to get challenging until around the fourth level. Until that point every Cylon ship was simply cannon-fodder – I would rarely take a single hit on these early stages.

Consequently, it was not long before I devised a level-jump facility, which is incorporated in this listing. Of course, I soon added others... As usual, enter the listing and save it on to one of your own blank tapes or discs, type RUN and follow the on-screen instructions.

```
 10 REM Cylon Attack mini-upgrade
 20 REM by Hac-Man 1990
 30 REM (C) The Micro User
 40 REM
 50 IF PAGE=&7000 GOTO 100
 60 FOR I%=0 TO (TOP-PAGE) STEP 4:I
%!&7000=I%!PAGE:NEXT
 70 *KEY0 PAGE=&7000|MEND|MOLD|MRUN
|F|M
 80 VDU 21:*FX138,0,128
 90 END
100 MODE 7:*FX15,0
110 PRINT "Please insert Cylon Atta
ck tape and hit any key...";
120 G%=GET:PRINT:PROCload:*TAPE
130 CALL &120
140 ?&28A6=0:REM start level (0-98)
150 REM N.B. the wave number displa
yed is the above value, plus 1
160 !&2563=&08A901A9:!&2AB3=&F0D001
A9:REM infinite shields
170 !&24A7=&05F001A9:REM infinite m
other ship shields
180 !&2CA5=&28A9EAEA:REM infinite f
uel pods
190 ?&28AA=3:REM number of refuelli
ng pods available (0-5)
200 CALL &257D
210 END
220
230 DEFPROCload
240 !&120=&208D46A9:!&124=&8D01A902
250 !&128=&0EA90221:!&12C=&00A004A2
260 !&130=&A2FFF420:!&134=&2001A041
270 !&138=&0DA9FFF7:!&13C=&F44C04A2
280 !&140=&432E4CFF:!&144=&48080D41
290 !&148=&4898488A:!&14C=&2903CAAD
300 !&150=&03CA8DFE:!&154=&AA68A868
310 !&158=&00602868
320 ENDPROC
```


Find out its limits.
Look in the mirror.
ATARI
1040STE
ATARI SM124
ATARI 1040STE

Introducing the powerful new Atari 1040 STE. With such an awesome machine, we're convinced the only limits you'll come across are your own.

Based on the incredibly successful 1040 STFM, the 1040 STE itself goes beyond the limits of its predecessor.

The 'E', by the way, stands for 'Enhanced'. But once you've discovered its amazing array of features, you may consider 'Enhanced' to be the understatement of the decade.

Perhaps the most outstanding feature of the 1040 STE is its graphics. Its palette contains over 4000 colours (all right, 4096 to be exact).

ST SERIES
LEISURE SOFTWARE
ST SERIES
PRODUCTIVITY SOFTWARE
ST SERIES
FIRST BASIC
HYPERPAINT
ATARI

To ensure precise and realistic images, the STE features 'hardware scrolling', enabling smooth scrolling in any direction and split-screen effects. And, with the SM124 monitor, you'll get razor sharp black-out-of-white text that's as clear as the type on this page.

To complete the picture, it is able to 'phase-lock' its video output to an external video source, permitting direct linking to a Genlocking device.

The 1040 won't just have your eyes swivelling in their sockets. Your eardrums will also take a pounding from the 8-bit PCM stereo sound.

The new PCM (Pulse Coded Modulation) sound system's two chips allow the 1040 STE to replay high-quality sampled sounds, in stereo, without burdening the CPU. Or, for even more of an earblasting, just add a couple of RCA output jacks and power the sounds through your own stereo.

Of course we mustn't forget memory. One megabyte of RAM comes as standard. If that's not enough, the 1040 STE provides four SIMM sockets. Simply plug in some SIMM (Single In-line Memory Module) boards and boost the RAM up to four megabytes.

To help you handle all this technology, we've added even more: a Blitter chip, capable of shifting data at high speeds independent of the CPU, and a new version of TOS.

The TOS 1.6 (operating system) has an enhanced file selector with drive-change buttons, improved desktop with file move, MS-DOS compatible disk formatting, and better application installation and auto-booting facilities.

As you'd expect, there's a huge range of peripherals including hard disks, floppy disks, laser printers, colour monitors and even Megafile 44, Atari's unique 44-megabyte removable hard disk.

As well as all this hardware, there are hundreds of software programmes for the 1040 STE - we're even throwing in the ST-Series Productivity and Leisure bundles free.

The Productivity bundle features a database, spreadsheet, word processor and business graphics package, and there's S.T.A.C., FirST BASIC, Hyperpaint and Prince in the Leisure bundle.

If you're itching to get your hands on the controls, there are two 15-pin analogue controller ports (which accept paddles, light-guns and light-pens) and a 9 pin mouse port and joystick port.

With adaptors, up to six people can use the 1040 at one time. Just in case it's too much for one person to handle.

At £499.^{99} it certainly won't be too much for one person to afford.

The ideal computer at the ideal price, you may think. We think so, too. But there remains only one potential problem: not whether you'll make impossible demands of the 1040, but whether the 1040 will make impossible demands of you.

Please send me further details of the 1040 STE and other Atari products.

NAME: ________________________________

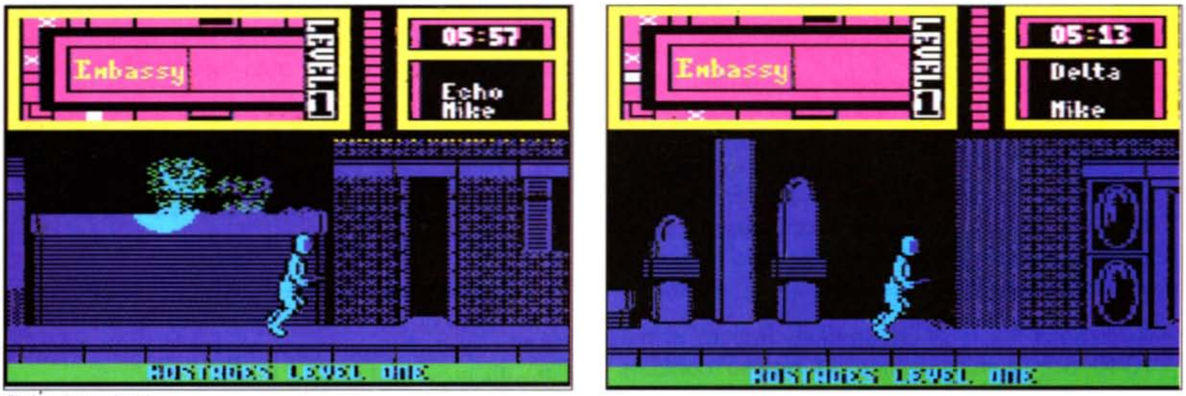
ADDRESS: ________________________________

________________________ POSTCODE ________

Please send to Atari Corp (UK) Ltd. Atari House,
Railway Terrace, Slough, Berkshire. SL2 5BZ.

ATARI 1040STE

WITHOUT IT YOU'RE JUST PLAYING GAMES



Placing snipers on level 1

HOSTAGES

... who dares?

Price: £9.95 (tape) £11.95 (5.25in disc)
£14.95 (BBC Master 3.5in disc)
Supplier: Superior Software, PO Box 6,
Brigg, South Humberside DN20 9NH.
Tel: 0652 58585

WE are used to big blockbuster games from Superior and Hostages, their latest release, is no exception.

The basic aim is to enter a building occupied by terrorists and rescue their captives. This seemingly simple enterprise is divided into three parts.

First, three snipers must be placed strategically around the building. The main display shows a sniper who can run, crawl or perform tumbling rolls while being tracked by the terrorists' searchlight. If he's caught in the beam he expires in a hail of bullets. Fortunately said sniper has an amazing ability to leap walls and get into any building.

On both the BBC Micro and Electron the screen shows a plan view of the building indicating the sniper's position and a number of suitable hiding places.

Accompanying sound effects are reasonable on the BBC Micro but rather inadequate on the Electron.

Stage two can be reached even if you have managed to get only one sniper in place, though it's vital to get your whole team ready to support him as they appear on the roof of the building.

Their task is to abseil down the building and crash in through a window. The carefully positioned snipers can be used to prepare the way by shooting out the glass first and perhaps eliminating a terrorist or two.

Actually smashing a man through a window is pretty difficult, and first attempts will send many a poor soul plunging earthwards.

If you find the use of keys difficult you may prefer to use a joystick – Plus One or First Byte types work equally well on the Electron.

Once again, it is possible to move to level three with only one man into the building. But with half a dozen terrorists spread over three floors, plus six hostages to get to safety, it is as well to concentrate on getting all three abseilers through the windows.

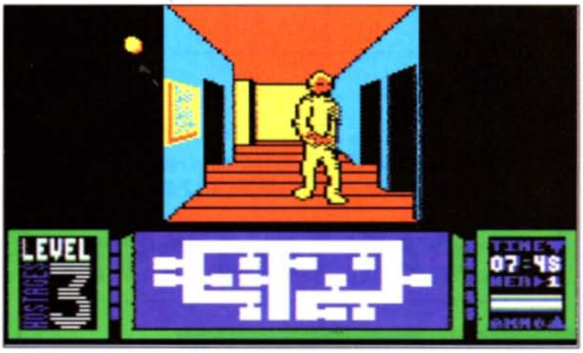
Level three is a three dimensional maze. The terrorists can appear at any time and you have to be quick on the trigger to survive. To make the game not too violent any shot terrorists are merely disabled.

When hostages are found they follow you to a safe room on the third floor while you try to ensure that they are not shot on the way by the enemy.

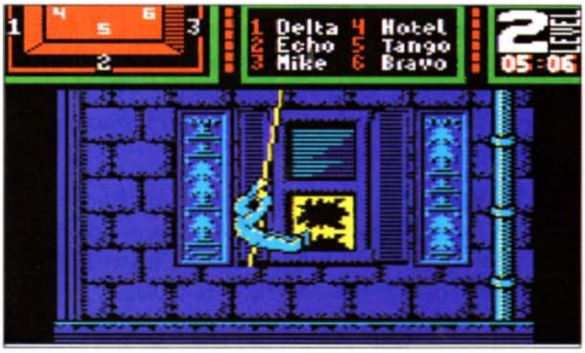
The graphics are very good and while it's quite hard to get started, the game certainly can grow on you and lead to that *just one more go* syndrome. If you don't object to violence I can recommend Hostages.

Rog Frost

Graphics	8
Sound	7
Playability	9
Value for money	8
Overall	8



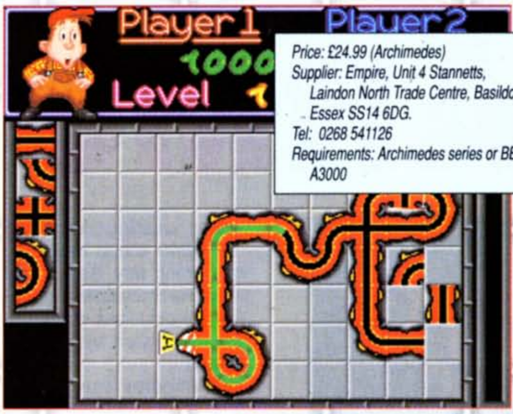
Forced entry on the second floor



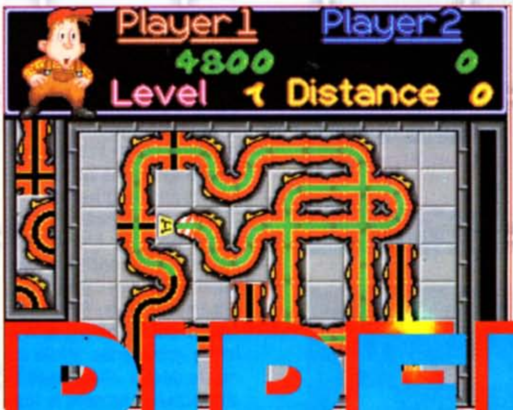
Level 3 – watchout for the terrorists

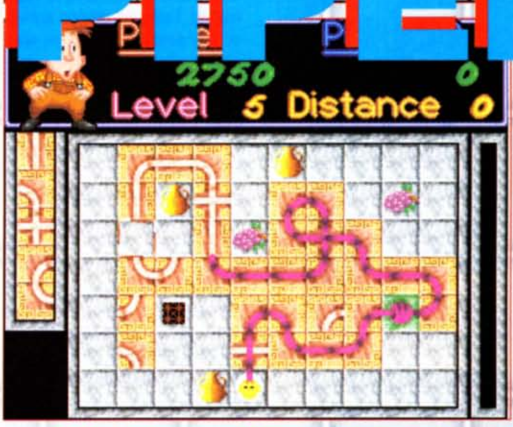
PIPEMANIA

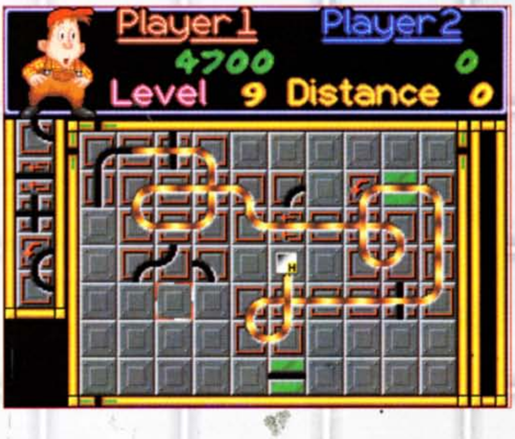
... *into the flooz*



Price: £24.99 (Archimedes)
Supplier: Empire, Unit 4 Stannetts, Laindon North Trade Centre, Basildon, Essex SS14 6DG.
Tel: 0268 541126
Requirements: Archimedes series or BBC A3000







FOR some time now we've been waiting for something that matches the polish of the 16 bit games. Well it has now arrived, and it's called Pipe Mania.

Right from the initial loading screen you know you're in the world of truly professional games writers – the graphics are superbly created and the music is perfect.

Once the game has loaded you are treated to an animated display of the title rotating carousel-style in accompaniment to a catchy little tune – which did begin to wear after about eight hours. But you can turn it down or off quite easily.

Gameplay seems simple: You must place pipe sections into a grid layout to form a specified length. There's a timer on the right of the screen that slowly descends, and when it reaches the bottom the flooz begins to flow down the pipe. Flooz? Sounds yukkie, and it is!

Unfortunately you can't choose which pipe sections are available – you have to accept what comes from a dispenser on the left. I am told that the order is not random but actually from one of eight preset sequences – but the one you get *is* random.

Placing pieces simply involves locating a marker using the standard – but redefinable – keys, mouse or Voltmace joystick and hitting Return, Select or Fire as appropriate.

I found the keyboard best although the mouse came a pretty close second. I don't like joysticks at all, but that's just my personal taste.

On the lowest set of four screens you get simple pipe sections: The four quarter turns, straight horizontal and vertical, and cross pieces – yes, flooz is a remarkable substance it will actually cross itself without interfering with the flow. Using five crosspieces on a single screen gives you a 4000 point bonus.

If you decide you've made a mistake you can replace a piece but this takes time and if the flooz is coming your way it requires nerves of steel.

Starting at level three you also get an opportunity to move off one side of the screen and reappear on the opposite side.

Each set of screens has its own theme. The first is simple pipes, but the second comes as quite a shock as you are suddenly transported to the Roman baths.

On this level there are a lot of squares that you just can't use – they're blocked by pretty pictures of grapes and chequer boards. But to help you are the reservoirs – these take longer to fill up with flooz so you can plan ahead.

The third set of screens goes hi-tech and it takes another jump of reality to see what pipes do what. It's here that the one way flow pipes make their appearance – just when you thought it was getting easier. After that you move to laying pipes in the street.

Between each level there's a bonus screen where pipe sections move across the top of the screen and you press space to make them drop. The idea is to build a pipeline so that when the flooz starts to flow it has a length of pipe to follow – it makes a change.

There is a password system to reach each set of pipes, but I won't spoil that secret.

There are multitudinous options, including key definition for every control and three levels of play – training, standard and Archimedes. This final level involves a completely different scoring system.

There are modes for one player, two player and expert: The first two are obvious – there are two pipe dispensers for the two player game and it's certainly a lot of fun. The expert level is one player but with two dispensers – it doubles your choice of pipe but is very tricky.

This is a superb game and makes a fun change from blowing things to bits.

Lazarus

Graphics	*10*
Sound	*9*
Playability	*9*
Value for money	*10*
Overall	*9*

MAN at ARMS

Price: £19.95
Supplier: The 4th Dimension, 1 Percy Street, Sheffield S3 8AU.
Tel: 0742 700661
Requirements: Archimedes series or BBC A3000.

AMONG the most recent games from The 4th Dimension comes this one, the first to feature an excuse to step into the character of a sprite.

Beyond brief, reassuring and thug-like instructions about penetrating and negotiating four levels of castle, the documentation is rather vague. You are given a few details to help you get started, but you'll soon run through your four lives on your first attempt, leaving you viewing a dismantled skeleton.

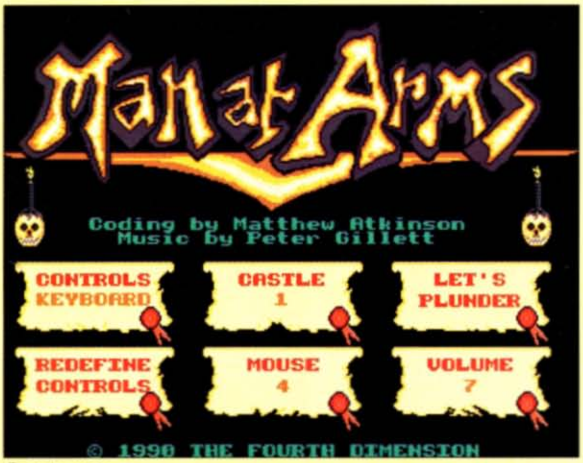
Playing Man at Arms brings back memories of various classic BBC Micro programs such as Repton, Ravenskull and even Bonecruncher – all pioneered by Superior. However, author Matthew Atkinson of Repton 3 fame fails really to convert his old ideas to the more colourful 32 bit micros successfully.

The game is still quite intriguing, and the sequence of events unpredictable. The display scrolls smoothly in the four-directions, albeit sluggishly, over a huge playing area.

Out to get you are venomous snakes and castle natives. Although some snakes mindlessly spend their time slithering around the levels, unworried by your presence, the majority have your death in mind.

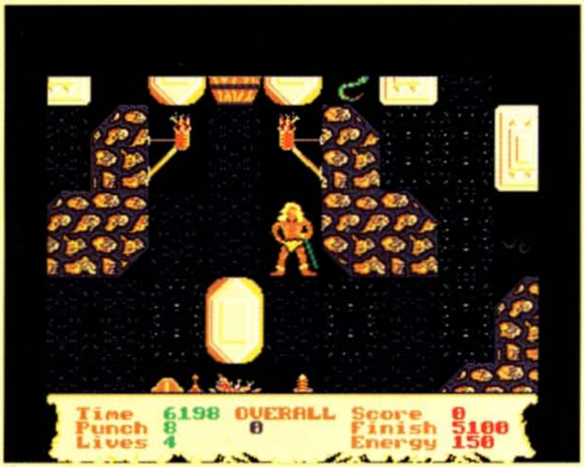
Progress is against the clock and you can chop the opposition into bare bones, earning much-desired bonus points, or plug for a temporary invincible status. In general, thunderbolt sword blazing is the best tactic.

There's a strategic streak to the action, which you'll have to learn as you go along. Stone boulders fall if not supported, crushing your barbarian warrior should he venture the wrong way. Barrels and other wardrobe-looking graphics are obstacles which can be negotiated by force or moved.



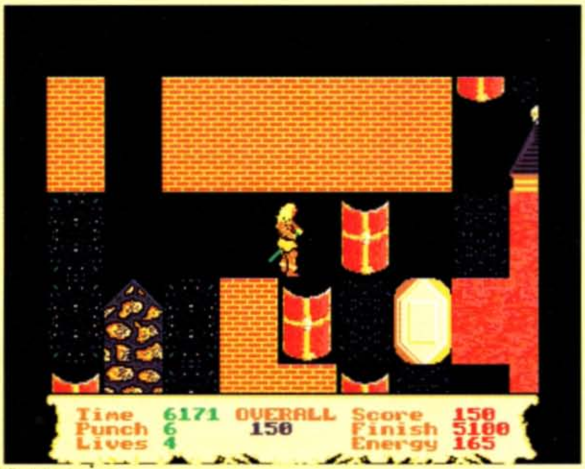
```
Man at Arms
Coding by Matthew Atkinson
Music by Peter Gillett
CONTROLS KEYBOARD   CASTLE 1   LET'S PLUNDER
REDEFINE CONTROLS   MOUSE 4    VOLUME 7
© 1990 THE FOURTH DIMENSION
```

The option screen



```
Time   6198  OVERALL  Score   0
Punch  8        0     Finish  5100
Lives  4              Energy  150
```

Getting started



```
Time   6171  OVERALL  Score   150
Punch  6       150    Finish  5100
Lives  4              Energy  165
```

Exploring the castle

Gameplay can get extremely bewildering at times, and in this respect the inlay blurb is correct – promising as it does many late nights sweating over your beloved micro.

Whether you'll be engrossed enough in the gameplay to ignore the occassional bugs is another question.

Animation appears to have been coded on a clockwork system, and kept to a minimum wherever possible. Acceptable on an 8-bit micro maybe, but not on a graphics-happy Archimedes. While the razzle-dazzle effect used to shift between screens is frustrating. I missed having a map of the area. Even if this was only available at the lower levels it would've allowed problems to be tackled in a less confused manner.

You can control your barbarian by joystick, mouse or redefinable keyboard. Unfortunately the mouse control is very difficult to use despite the sensitivity setting.

Sound is where Man at Arms scores most. Equipped with user-selectable tunes, this plunder and havoc game also has a whole family of sound effects: Your warrior can be heard breathing if you stop moving, while panels open with a wood-awakening creak.

Unfortunately at times the game has an amateurish feel and doesn't stand up as a worthy Archimedes adventure. It may suffice as a poor man's Ravenskull, but I can't recommend it.

Matthew Ridd

Sound	*8*
Graphics	*4*
Playability	*6*
Value for money	*5*
Overall	*5*

SPORTING TRIANGLES

...know what I mean?

Price: £24.99
Supplier: CDS Software, Nimrod House, Beckett Road, Doncaster DN2 4AD
Tel: (0303) 321 134
Requirements: BBC A3000 or Archimedes series

WITH my sporting head firmly screwed on, I waited for CDS Software's debut Arc release, promised to be the first in a gaggle of games specifically coded for Acorn's 16 bit micro–crushing machine, to chug into memory from the single floppy disc. Sporting Triangles initially pops up a loading-screen, followed closely by a rather tired interpretation of the Central Television sporting knowledge programme's theme music. Beyond the strain of enduring this musical calamity though, I'm sure all fans of this quiz, and trivia likewise, will agree this is a promising taster from a virgin Archimedes software house.

Before diving into the head-spinning array of the 2,500 or so questions included in the game – some graphically connected – the Option screen must be satisfied. In line with the Central TV programme, contestant numbers are limited to three. Any spare places not accommodated by a human player are happily filled by computer substitutes.

This simulated opposition have user-set ability levels attached to them, in case they prove, to the human player's disadvantage, too clever. The cunning computer-generated contestants even supply their own names.

A time limit can be set for the general question round, in a bid to hasten the slower participants into answering.

Playing order is decided on the simulated tumbling of a die, and the screen changes to reveal the sport selection menu.

Twelve specialist subjects are available: Indoor sports, Athletics, USA sports, Equestrian (all things horsey), Soccer, Cricket, Rugby (Union and League), Golf, Tennis, Boxing, Sport-on-wheels and Pot luck. Players take their turn to choose the appropriate icon for their favourite – although this does not in any way secure an easy passage, or just questions on your selected topic. Movement later around the board in the standard question rounds, chances a stop on a rival's sport, introducing a twist to the gameplay.

In an attempt to retain the novelty of each quizzing session, the questions are loaded from disc in a random sequence. Once installed, battle begins as the display clears to show a graphic of the players and the studio.

The contestant sprites change according to the specialist subject selected, the tennis character looking ferociously like John McEnroe. For the first two rounds all the players trip around a communal triangular board, moving the puck with each die throw.

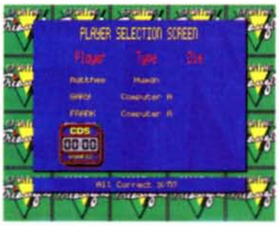
SPORTING
Triangles
CDS

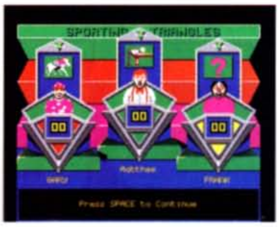
The suavely portrayed compére then maniacally juts his chin about, blinking busily, while the question fills a text bubble. Guided by your own conscience, and against the rapidly decrementing digital-display clock, the answer is revealed with a tap of the spacebar and you must award yourself accordingly.

This activity returns again for the fourth and fifth stages, but is interspersed with a panic *try and choose the correct response* section dubbed Hit for Six. Be smart and plump for the correct personality, deduced from the clues flashed overhead, all in the 30-second countdown period and gain yourself a healthy six-point bonus.

A Jigsaw Picture question cycle involves connecting the slowly disclosed graphic with the appropriate item from the list given, while the quick-fire buzzer type round completes the competition. Here only by stabbing at the contestant's assigned key can you hope to bleep and answer before another gains the point.

Graphics are very accommodating throughout and well designed. Although animation is rare, the game show host does gesticulate in a most amusing, cartoon-like manner and the die rolls smoothly about its axis on each tumble.

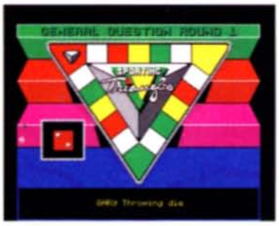


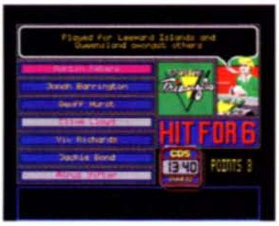


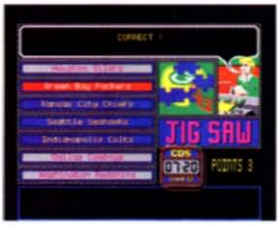
Sound is rather disappointing and could have been better exploited, I felt. In particular the short, plodding introductory tune – using the standard internal sound modules – reveals an obvious lack of attention in development.

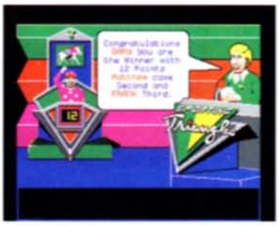
Progress of scores during play are easily tracked, with the screen switching periodically to show the emulated studio set and player status. The joystick's fire button is offered as an alternative to a thump on the spacebar.

A small handbook provides all the necessary details to enjoy the game, even if it is produced as a cross-format text and details certain keystrokes for other makes of computer – but none for the 32 bit micro release. In playing the game I can claim to have spotted one tiny typing error in the answer text, but can otherwise vouch for the accuracy of the material.









Sporting Triangles certainly does not attempt to woo customers in the Trivial Pursuit general knowledge market – existing computer conversions are too strong for it to succeed here.

However, within its limiting specification Sporting Triangles has been successfully transferred to the Arc and despite its sometimes lackadaisical game play, should not fail to entertain well-read sporting buffs.

Mathew Ridd

Sound.........................4
Graphics......................7
Playability...................5
Value for Money...............7
Overall.......................7

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Primary word processing

John Clemence provides an overview of the word processors now available for primary education – and beyond

AS more and more primary schools make the transition from BBC B and Master 128 to BBC A3000 or Archimedes computers Information Technology coordinators will be anxiously seeking suitable software to continue the work already started with the older machines.

Since children are invited to write in almost all areas of the curriculum perhaps the most generally useful application software so far has been the word processor. So let's take a look at what's available.

Some of the programs I have included in this review may seem rather advanced or powerful for consideration in the primary

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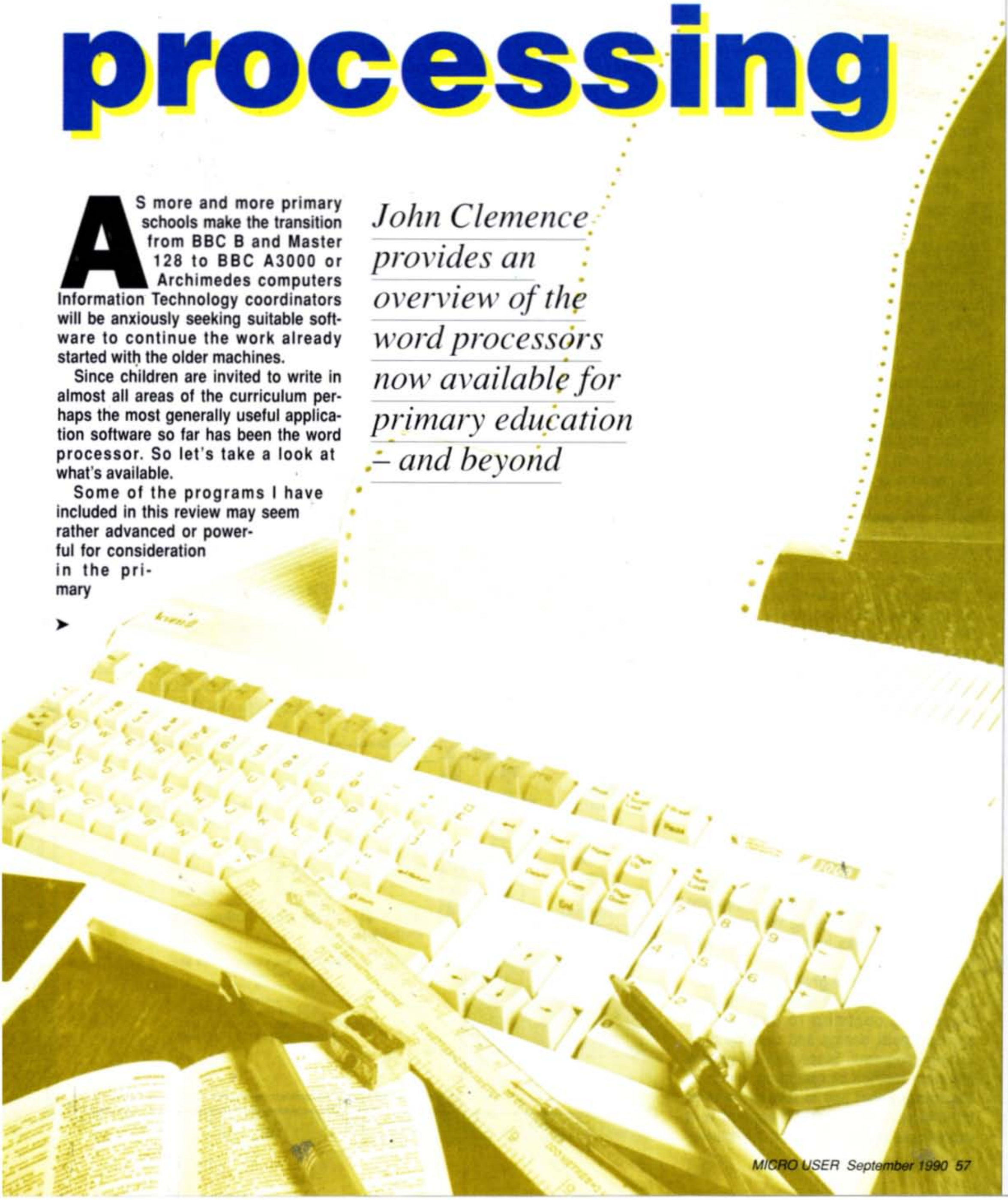


classroom. However, from my experience of working with 3rd and 4th year juniors, they are often ready for, and more motivated by, packages that give them a real sense of handling powerful facilities.

They do take a pride in their work and a package which allows them to control the layout and change the structure without committing them to extensive and repeated handwriting will often encourage the interest they take in their work.

Furthermore, by giving children these facilities we convey to them that we respect their work and the need to assist in its creation and presentation.

Adults have been reasonably well catered for with First Word Plus, PipeDream, View and new versions of WordWise Plus and InterWord.

Although some of these are suitable for use with older juniors we have also been waiting eagerly for the sorts of packages that gave us similar opportunities as Prompt Writer 3, Folio, Stylus, PenDown or Edword to introduce the word processor to younger children through the new machines.

The programs here can be divided into three groups. Group one comprises those that are completely new and make full use of the Risc OS including the windows, mouse, colour, memory and which may also be multi-tasking – that is, they can run at the same time as an art package or music program.

Group two is those which are similar to the originals but which have been adapted or re-written for the A3000/Archimedes to make more use of colour, the mouse or more memory.

Group three is those which are identical in appearance and operation to the BBC Micro versions and which may be running under one of the emulators.

Those in the last group will appeal to teachers who feel quite happy with the work they are already doing and are mostly concerned to maintain a particular approach to their work. Group two is for those who, while preferring to use a familiar package, will also welcome some of the extra memory or facilities that the 32 bit machines have made possible.

Users of packages in group one will be those who want to introduce their children to a more powerful environment and one which is being increasingly found on machines from other manufacturers.

Packages in this group tend to conform to a standard of operation which is becoming common to databases, spreadsheets, design and desktop publishing programs. Since they all have a common method of operation, much of the learning that has to take place is of general value and can be applied to a wide range of applications in the future.

GROUP ONE

Phase 1

This new multi-tasking package combines many of the properties of a word processor and some of those of a desktop publisher. Although I had Phase 1 for review in pre-release form I was very impressed by it.

Text can be entered in any of six sizes although you cannot mix the sizes on a given line. Only one font was available in my version but the option to change the text style appeared in the menu in light print, indicating that a later version would allow for a choice of fonts.

Marking and moving text has also not yet been implemented, but the options are already indicated in the menus for later implementation. The format of text can be right aligned, left aligned but not fully justified.

There are three page layouts – single column, two column or front page, in which the heading is set to a fixed size. You can change between these layouts with text in memory but you will need to re-size your text since this is re-formatted to a set size after the page layout changes.

In addition to the very pleasant way that this program allows you to handle text you can also drop up to 10 sprites into a piece of text.

By using a two column setting I found that I could place a picture in the middle of the page and the text then appeared to flow around both sides of it. Pictures can be moved, replicated or sized, but not cropped.

I discovered an option in one of the menus to design the way that a file is set up for children. However, this was not mentioned in the otherwise very satisfactory booklet supplied. And it is possible to save a text in Ascii format so it could be dropped into other packages or even used in electronic mail.

Another very nice feature of Phase 1 is that while you can save work by dragging an icon to an appropriate directory viewer as with other Risc OS operations, pressing f8 on the function keys does a lot of the work for you. It opens the appropriate directory and all you need to do is choose the name for your work.

Printing depends upon the Risc OS printer drivers so a wide range of printers could be supported. I very much look forward to the finished version of this program.

PenDown

THIS is another of the new generation of word processors for primary schools. Unlike other publishers, Longman Logotron has not just transferred or re-written its package to look like the BBC Micro version – this is a completely different animal.

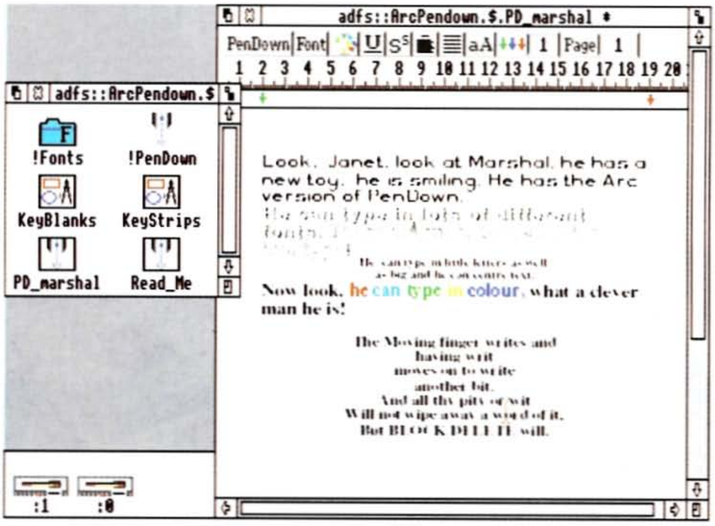
It is one of the first for primary schools to make full use of the Risc OS windows, fonts, colour and high resolution display.

It follows the standard conventions so that the mouse buttons work in just the same way in PenDown as they do in all properly written application software.

The final version will probably not be available until September. However, even in this pre-release form it is an impressive package.

In some respects PenDown behaves rather like a desktop publishing package. It offers full *what you see is what you get* (WYSIWYG) presentation on screen and the facility to mix different fonts and typefaces of almost any size and colour.

Printing, which is rather slow, is achieved using the drivers supplied on the applica-



Look, Janet, look at Marshal, he has a new toy. he is smiling. He has the Arc version of PenDown.
He can type in lots of different fonts. [illegible]

He can type in little letters as well as big and he can centre text.

Now look, he can type in colour, what a clever man he is!

The Moving finger writes and
having writ
moves on to write
another bit.
And all thy pity or wit
Will not wipe away a word of it,
But BLOCK DELETE will.

PenDown

tions discs. However, results when using a 24 pin printer are of the very highest quality. I found the output on an Integrex 132 Colourjet to be less impressive, but this could be a problem with the printer or the printer driver since there is clearly very little to complain about on the monitor.

Text can be formatted in a number of different ways, controlled by rulers inserted into the text and a format menu. The ruler currently in operation appears at the top of the screen and allows for very easy control over tab stops and left and right margins. Its effects are instant.

Any number of rulers may be used, thus allowing provision on the page for pictures and diagrams. The ruler can display inches, centimeters or picas and there is also an option to turn on or off a vertical ruler.

Using the two rulers together allows for very precise control over layout – especially important when you know that you want to add a picture or diagram after printing.

PenDown does not offer facilities for mixing text and images on the screen, so these would have to be added later. Additionally any part of the text may be aligned to the left, right, centre or fully justified.

The page can be viewed full size or scaled down as low as 50 per cent or up to 150 per cent, allowing detailed work with small print sizes and an overall view of the page layout.

You can also choose the size of page you propose to create from a menu which gives a more than useful selection ranging from A6 to A3 portrait or landscape and a range of choices for fan fold paper.

The teachers to whom I have shown PenDown have been most enthusiastic, especially those who were wondering why they needed to change from the BBC B to the BBC A3000.

1st Word Plus (RELEASE 2)

I have included this package because although it is a very advanced word processor – and the most expensive of those reviewed here – it is quite easy to use and offers children some features not available elsewhere.

It is advanced in the sense that it was written for adults, so all messages and legends, while clear and well thought out, make no concessions for younger users.

However, it is possible to load the program and start writing with very little assistance. Also this is the only package in this collection to have a built-in spelling checker and dictionary.

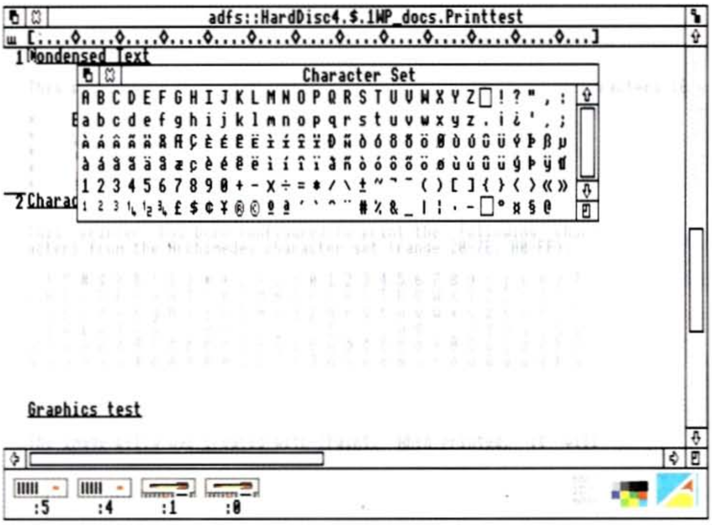
It is also the only one of the packages to be able to handle footnotes, but this might be considered as an unnecessary luxury for the primary classroom.

However, it is my experience that if you make facilities available to children they do have the most delightful way of being able to use them.

1st Word Plus presents the writer with a white screen and black print. This is very clear and easy to read. However, it is not possible to use alternative fonts to create headings and captions.

The format is controlled by rulers inserted into the text,and like other packages, the ruler currently in operation appears at the top of the screen and can be altered easily to control the text layout.

Text has to be re-formatted manually after the ruler has been adjusted. This means only pressing one key, but you have to do it for every paragraph or go to the sub-menu to re-format the whole document in one operation.



1st Word Plus

GROUP 2

Stylus

THIS has been re-written to take advantage of the improved screen quality and the availability of the mouse. The Archimedes version does not allow the program to talk to you as did the BBC versions, but makes use of very clear icons to help find all the facilities required.

If, like me, you find some icons less than clear to understand you'll appreciate the way that after a short pause Stylus explains the icon you are pointing to with your mouse.

Text of different styles and sizes can be mixed as long as this is restricted to one size per line. This is a achieved by a system of simple printer codes entered into the text. It might be a cause of some confusion to younger children.

Stylus does not allow for the marking and manipulation of text, but is very user friendly and suitable for newcomers to word processors. A new version of the program, Stylus Plus, will, it is said, support more of the editing functions of more conventional word processors.

Unfortunately Stylus does not show users what their text will look like until it is printed. This appears to be an attempt to keep the new version as similar to the BBC B one as possible.

Stylus has built-in facilities for the editing of Concept Keyboard files which can then be used with the word processor. These facilities make good use of graphics and, as with the earlier version of Stylus, are very easy to use. This will only work where machines have been fitted with the I/O Expansion Card.

Loading and saving work or Concept Keyboard files is nicely handled and there is no need to try to remember the name of your file since they are all listed on the screen. My only complaint about this is that the program does not remind you which file you loaded most recently. However, this package has been greeted with great enthusiasm

Wordwise Plus

Those with long memories will remember this word processor with considerable affection. The new version offers two variations, !WordWise and !WW80. Readers not familiar with this package may find the following points of interest if they are considering buying Wordwise Plus.

The program has two modes of operation, the editor and the preview screen. The editing process takes place on a 40 column – Mode 7 – screen which makes it very easy to read even on the most meagre of monitors.

The Arc version also offers an option to

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work on an 80 column screen display giving a better but by no means complete idea of how the text will look when printed.

Entering text is very simple and no decisions about the layout have to be taken until much later in the writing process.

The disadvantage of this word processor is that the layout of your work is controlled entirely by a system of embedded codes. These appear on the editing screen in green and look rather strange when you first begin to use them. There are also rather a lot, but you only need to learn a very few of them to exercise quite considerable control. The preview mode allows you to see what the final text will look like when printed. This scrolls up the screen at an amazing speed and you have to be very quick with the spacebar to stop the work in just the right place. A much better method is to place a marker at each end of the text to be previewed and then preview the marked section.

All this might sound a little clumsy but in practice WordWise is really quite simple to use and is one of the cheapest of the more powerful options for this range of computers.

On the negative side is the rather poor handling of files. Although it is easy to catalogue the disc from the menu by issuing a *CAT you then have to remember the names of your files in order to load them into the processor. Various third party publishers have produced utilities to help with this aspect of the program on the BBC Micro so perhaps somebody will do the same for the Arc version before very long.

Inter-Word

FROM the same stable comes Inter-Word, even easier to use than WordWise Plus, which shows you what your work would look like as you type it in.

Text layout is controlled by an instant effect ruler. As you alter the ruler all the text below it instantly reformats to show the effect of the alteration.

You can add as many rulers as you wish to give a variety of layouts, and can also see some of the special effects such as bold typing, underlining, italics and page boundries.

Filing was always a strong feature of Inter-Word, and this is even more important with the storage capacity of the ADFS discs in use on the A3000. Selecting Load or Save displays the current directory. It is not possible to tell from this list which are sub-directories and which files, but selecting a directory automatically opens it and lists the files within it.

Inter-Word is very nice to use and the A3000 version has many extra features including full access to all the screen and text colours available on the Archimedes and various options regarding the longer line lengths which the new machine allows.

GROUP THREE

Folio

THIS has been made available for the A3000 machines and runs under the latest versions of the !65Host. It is substantially identical in use to the BBC B version including the amount of memory available on the Model B rather than that available on the Master 128.

It runs rather slowly under the emulator, and a writer with only reasonable keyboard skills will often find that they have left the computer behind from time to time. In this case it is probably appropriate to consider if this package is the correct one for such a user.

Folio offers many appealing qualities: It has a good range of different fonts and print sizes, although any single file can only make use of one font and size.

It lets you see on the screen what your work will look like including both the print style and the page appearance.

What it cannot do is allow you to mark and move, copy or delete areas of text, so this must be considered an important limitation for children who have reached the stage of their development where they are ready for these activities,

Loading and saving files is well supported so long as you know that pressing Tab at the appropriate point presents you with a complete Port Folio of work.

There are also seems to be a lot less difficulty with this version with disc filing and messages such as *editor can't grow*, *wrong editor* and so on. Folio clearly prefers to work under ADFS.

Folio can be used with a Concept Keyboard but I had too little time to explore this option fully. A native Archimedes version of Folio is on its the way.

View

Acorn's own word processor was built into the Master 128, and many newcomers to the Archimedes range have been a little surprised to find that they were not provided with this or something similar. If your children are able to cope with View and you feel you want to provide a certain consistency in your approach to their work this may be a good purchase.

Text layout in View is controlled by rulers inserted above the text. Altering the ruler – right margin, the current indent, tab stops and so on – has no effect on the following text until it is reformatted manually.

As well as controlling the overall layout with rulers, View uses a system of two letter codes called stored commands which are entered in a special margin on the left of the screen. These control the size of the left margin, the centering of text, footers, headers and several other facilities less appropriate for use by children.

The 32 bit version allows you to have lines of up to 132 characters on screen but is otherwise identical to the version supplied with the Master Compact.

Coming soon

Unavailable for inclusion in this overview were Classmate WP from Clares (Classmate has been delayed indefinitely due to illness) and Junior Impression from Computer Concepts.

Classmate WP is a multi-tasking word processor that uses outline fonts and has teacher (or parent) controlled menus while Junior Impression is the Impression DTP package with more complex options removed.

Conclusion

It is clear there is no shortage of choice at almost every level of usage. Within each group there is some progression with the products in group one giving the better graduation from use in infant work to top junior.

Selecting products from different groups, especially groups one and two will allow very fine tuning to the needs of pupils. Of course, the cost of any given school having a range of packages to suit all needs might be prohibitive.

Suppliers

Folio (£35): ESM Abbeygate House, East Road, Cambridge CB1 1DB. Tel: 0223 65445.
View (£45), 1st Word Plus (£91.94): Acorn, 645 Newmarket Rd, Cambridge CB5 3PD. Tel: 0223 21441.
Stylus: Stranmillis College, Stranmillis Road, Belfast BT9 5DY. Tel 0232 381271 ext 389.
Phases (£10): NW Semerc, Fitton Hill CDC, Rosary Road, Oldham OL8 2QE. Tel: 061-627 4469.
PenDown (£39): Longman Logotron, Dales Brewery, Gwydir Street, Cambridge CB1 2LJ. Tel: 0223 323656.
Classmate WP (£39.95): Clares Micro Supplies, 98 Middlewich Road, Rudheath, Northwich, Cheshire CW9 7DA.
Junior Impression (£103.44), Inter-Word (£33.35), Wordwise Plus (£33.35): Computer Concepts, Gaddesden Place, Hemel Hempstead, Herts HP2 6EX. Tel: 0442 231632

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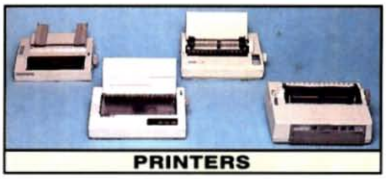
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RACE ACE

Go for a grand prix title courtesy of Mike Goldberg

GRAB your crash helmet and fireproof togs and get down to *The Micro User* Grand Prix circuit for a quick spin around the track – or perhaps only part of it.

Let's see how far you can get around the course avoiding the other cars, cones, ditches and oil patches. Your fuel is limited and as it runs low your car will begin to smoke.

Simply driving over a fuel marker will fill your tank again and gathering four markers gives you an extra life in addition to the three you start with.

At full speed you'll take about two minutes to drive round the whole track so there's plenty of room to play in and lots of scenery to view – when you're not watching the road.

There are four listings to type in: The first two generate the machine code and sprites when run and should be saved as CarAssm and IkeAssm respectively. The second two – save as Car and Race – are required for the actual game along with the two generated files, CarCode and Ikons.

Enter each listing in turn and ensure they are correct using the checksums – and don't forget to save each one before running it. The final program – Race – cannot be run on its own and must be chained by *Car*.

Listing I

```
 10 REM Car Race Listing I
 20 REM by Mike Goldberg
 30 REM (c) The Micro User
 40 code=&700
 50 FOR I%=0 TO 2 STEP 2
 60 P%=code:[OPT I%
 70 JMP CarCode
 80 .BakCode
 90 LDX#0:LDA#8:STA&3FFE
100 .loop
110 LDY#0:LDA#32:STA&3FFF
120 LDA&4000,X:STA&72
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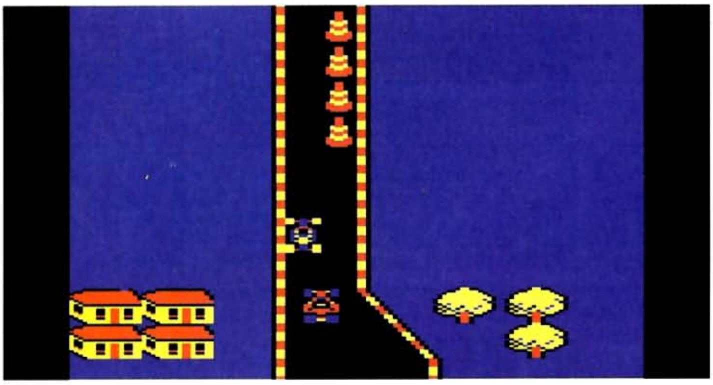

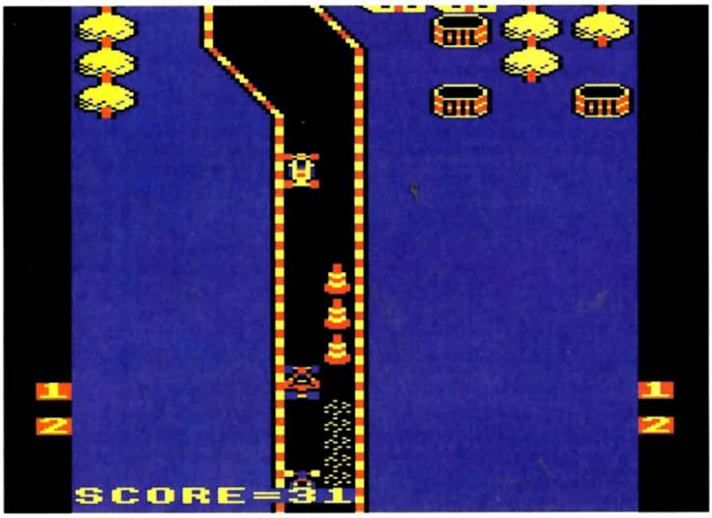

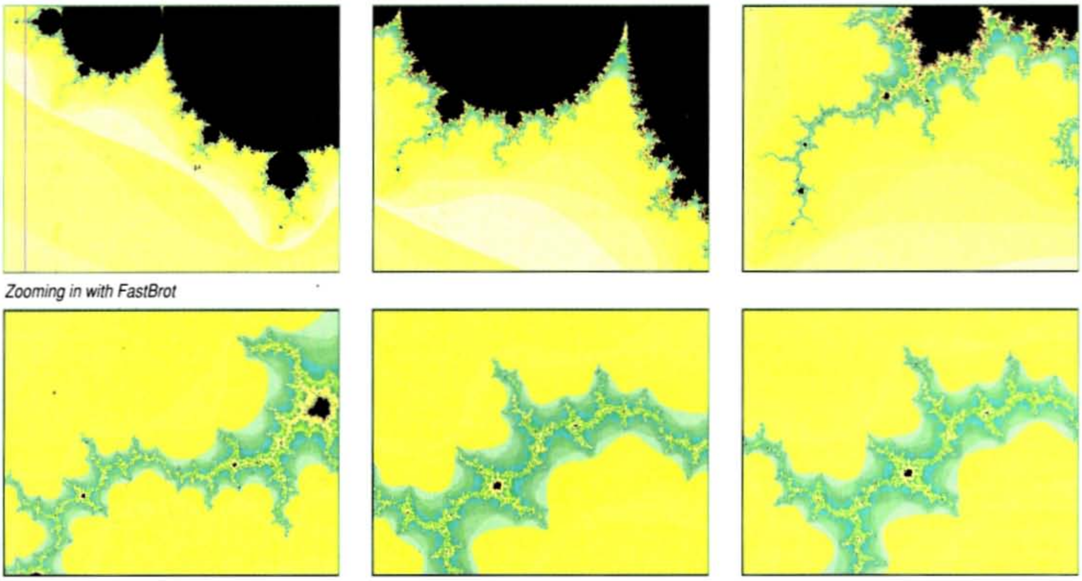

Zooming in with FastBrot

From fractals to spark plugs

Teri Paul takes one step beyond and enters the PD zone

NEVER slow to take up the gauntlet, several BBC Micro owners are in the process of opening their own PD libraries for the 8 bit machines. With the amount of talent and machines out there, there should be some interesting things winging their way into these pages soon.

If you are interested in obtaining software, or are public spirited enough to add you masterpieces to the public domain, here are the people to contact:

Stephen Auty, Cotswold PD Software, Maycombe, Field Road, Whiteshill, Stroud, Gloucestershire GL6 6AG

Robin Pike, 4 Mayfield Road, Girton, Cambridge CB3 0PH

Rafael Jay, Onslow House, Weston Road, Bath, Avon BA1 2XX

Duncan Webster, 7 Ashdale, Thringstone, Leicester LE6 4LW

In the meantime I've been looking at the latest Archimedes discs which made a resounding thud on my desk this week, I discovered various copies of DeskDuck – thank you. I have popped one on to the monthly disc for your delectation and pleasure.

Your new pet will quite happily glide along the icon bar giving an occasional quack. Quite nice to look at, but the fun comes with the Interactive Bread. Click the mouse just above the icon bar and watch the duck race towards it just like the real thing.

However, I do have a problem, and that's the quacking. Yes, you can turn it off, but someone else always turns it on again. Therefore, from bended knee I ask for someone to write an Interactive Duck Hunter as soon as possible.

The Micro User has covered the topic of fractals several times over the years and a very nice Mandelbrot is now available. The idea is quite easy to explain – imagine a picture of the UK taken from outer space. This would show the outline but none of the details, but as you come closer more and more details become apparent. The same applies to a Mandelbrot, the "closer" you get the more detail is revealed. FastBrot allows you to use the mouse buttons to zoom in and out and to calculate the new settings. What makes it so exceptional is the speed.

A de-archiver is a useful utility, and !SparkPlug from David Pilling is now available in the public domain. Though not a public domain library, David sells good software quite cheaply. You can contact him at PO Box 22, Thornton Cleveleys, Blackpool FY5 1LR. !SparkPlug allows you to unpack PC, ST and Amiga archives as well as the obvious Archimedes ones. As more people archive their discs to cram more in, this is a particularly nice program to have. The archiver – !Spark – is available from David.

To operate, double click on the !SparkPlug icon which will then appear on

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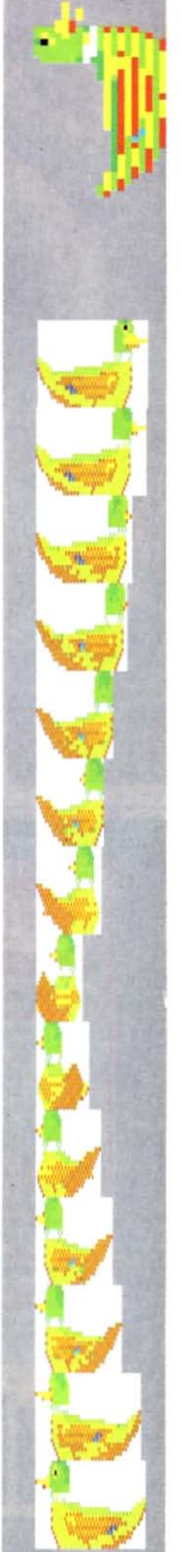

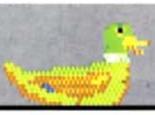

NOAA 11 03/05/90

A NOAA picture

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the icon bar in the usual way. Then double-click the archives to load them and reveal their contents. You can then drag the files and applications out.

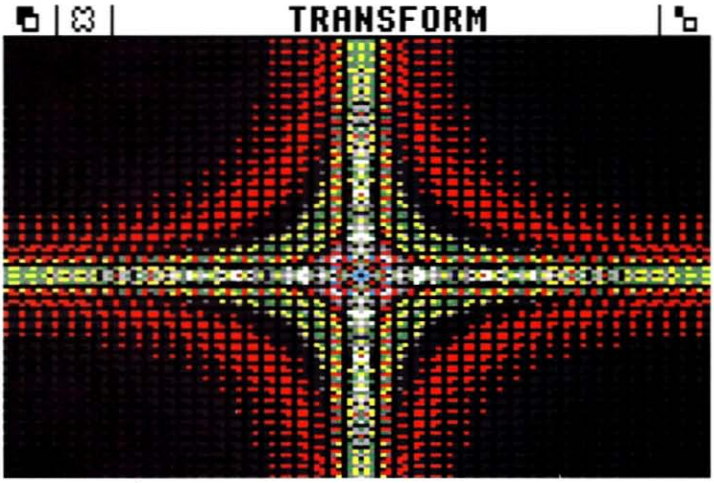
One problem you may have is where to unpack these files to, as the disc you are looking at is probably full. The answer is to use the ram disc. Doing this on one disc I received gave me access to another of the Norwegian Brothers in Arm demos, Bounce.

It's beautifully done, though some of the backgrounds are a little hard on the eyes. There is an interative side at the end which makes me wonder why they don't write some games. Definitely one of my favourites this month.

If you want to keep a momento of the good weather to keep you going through the gloom of an English winter, James Ferryman has decoded a picture from the NOAA satellite which we have added to the monthly disc. Other similar images can be acquired from APDL.

Next month

The concept of hypertext comes from Apple Macland, and can be found in commercial products on the Archimedes like !Genesis and !BookBinder. However, Nick von Sommerton has added !Hyper to the public domain and I will be taking a closer look at it and putting it on next month's disc.



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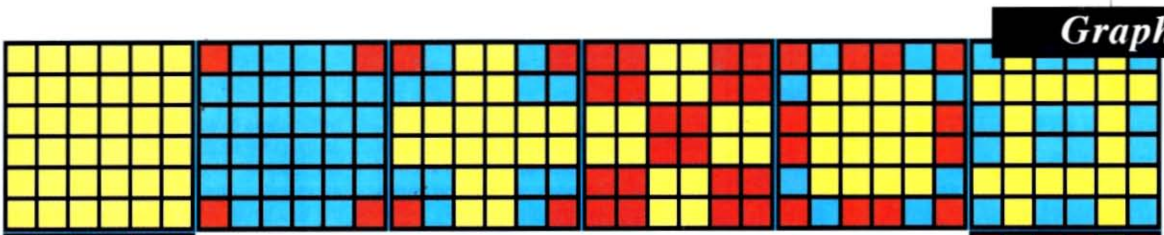
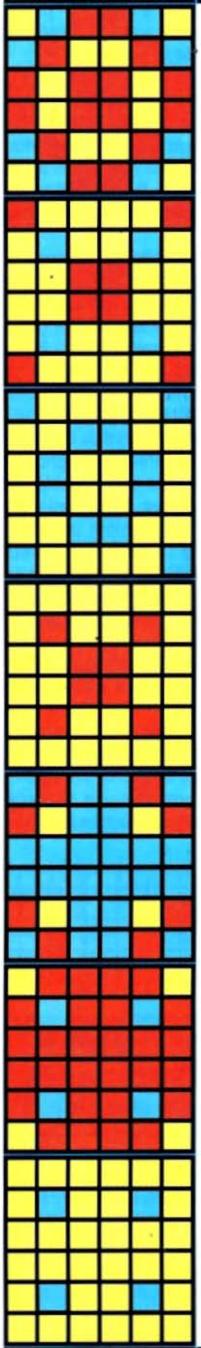




GRIDDLES

More mathematical magic is conjured up by Gordon Lee

THE coloured grids which appear on these pages are not randomly produced displays but are members of logically connected sequences generated by the computer according to a simple rule.

Because of their grid-like appearance this computerised graphics routine has been called Griddles. At its simplest level it can be used to produce a colourful display of endlessly changing kaleidoscopic patterns, but if looked at in slightly greater depth, it poses a number of surprisingly enigmatic questions.

Before we start exploring what Griddles can do type in the listing here and ensure you're made no errors using the checksums.

To enjoy watching the griddles develop you first need a square array of any convenient size. To illustrate the idea, we'll take a grid of 8 by 8 cells shown over the page. Throughout the entire process there is just one simple rule: A square coloured yellow has a value of one and a square coloured red has a value of zero.

The display is started off by giving each individual cell an initial value of one. In the case of the eight by eight grid just mentioned, each of its 64 component cells will therefore be coloured yellow. This is shown top left

The computer uses a simple routine to create successive generations of patterned grids, each of which is directly dependent on the preceding generation for its design.

To compute the colour into which any individual cell will turn in the next generation simply add up the values of each of its surrounding cells and calculate the remainder that you would get if this total were divided by two.

Put mathematically, reduce the total to modulo two. For example, in the top grid, each corner or edge square is surrounded by either three or five yellow squares and so will add up to a total of either three or five. These, therefore, will score a value of one as both three and five give a remainder of one when divided by two. Consequently, in the next generation these squares will be coloured yellow.

However, each of the centrally placed squares will turn red in the next generation as each is surrounded by eight yellow cells.

This is because they have a total of eight and eight modulo two equals zero – the value of a red cell. Note that the value of the central cell itself is not included when adding up the total – just the three, five or eight surrounding cells.

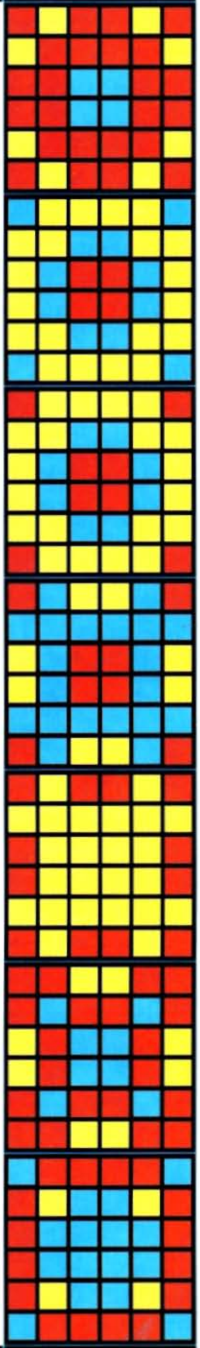
Calculating the totals of each of the cells in turn gives us the values which determine the colours displayed in the succeeding generation. Repeating this whole procedure will produce a succession of symmetrical patterns which, after the first couple of generations, will get more complex as the values represented by the different coloured cells interact with each other.

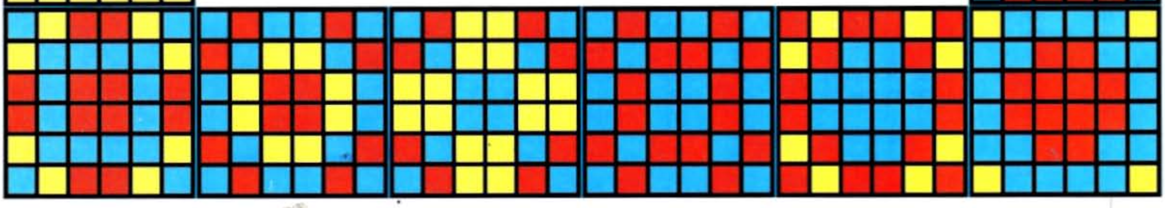
The effect on an 8 by 8 grid from generations zero to seven is shown on the following page. Note that in creating each succeeding generation the pattern is not altered until all values of cells in the current grid have been computed. If you are familiar with John Horton Conway's game of Life you will recognise this principle.

This leads on to the question *What will the eventual outcome be?* It is here that the enigmatic and unpredictable nature of Griddles becomes apparent. Any sequence of grid patterns must have one of three possible outcomes:

- All squares on the grid will sooner or later turn to red, each with a value of zero. If you use the listing given on a grid of size seven you will find that it turns all-red on generation four.
- All squares will turn yellow, returning the sequence to its original state. Grid size eight produces an all-yellow pattern at generation seven. The program is designed to stop running when an all-yellow or all-red grid is encountered – after generation 0 – otherwise the display will run for ever on an

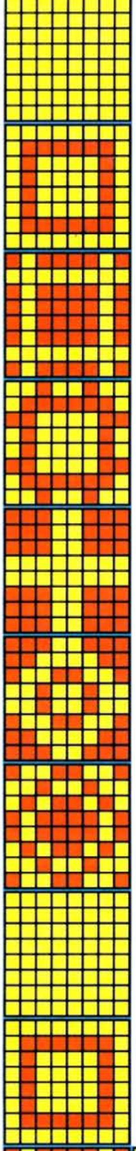
➤





```
   10 REM Griddles
   20 REM by Gordon Lee
   30 REM (c) The Micro User
   40 MODE 1
   50 VDU 23,240,127,127,127,127,127,127
,127,0:VDU 23,1,0;0;0;0;:VDU 19,7,6,0,0,
0
   60 INPUT"Input number of colours? (2
or 3) "M%
   70 INPUT"Input size of grid  (Max. 20
) "S%
   80 DIM N%(S%+1,S%+1),M%(S%+1,S%+1),C%
(2)
   90 CLS:G%=0:FOR X%=1 TO S%:FOR Y%=1 T
O S%:N%(X%,Y%)=1:NEXT:NEXT
  100 PROCprint:PROCchange:GOTO 100
  110 DEFPROCchange
  120 FOR X%=1 TO S%:FOR Y%=1 TO S%
  130 Z%=N%(X%-1,Y%-1)+N%(X%,Y%-1)+N%(X%
+1,Y%-1)+N%(X%-1,Y%)+N%(X%+1,Y%)+N%(X%-1
,Y%+1)+N%(X%,Y%+1)+N%(X%+1,Y%+1)
  140 M%(X%,Y%)=Z% MOD M%:NEXT:NEXT
  150 FOR X%=1 TO S%:FOR Y%=1 TO S%:N%(X
%,Y%)=M%(X%,Y%):NEXT:NEXT
  160 ENDPROC
  170 DEFPROCprint
  180 FOR Y%=1 TO S%:FOR X%=1 TO S%
  190 Z%=N%(X%,Y%)+1
  200 COLOUR Z%:PRINTTAB(X%+5,Y%+1)CHR$(
240);
  210 C%=N%(X%,Y%):C%(C%)=C%(C%)+1:NEXT:
NEXT
  220 COLOUR 2:PRINTTAB(1,S%+3)"Red:";ST
R$(C%(0));"  Yellow:";STR$(C%(1));
  230 IF M%=3 PRINT"  Blue:";STR$(C%(2))
;"   Gen:";STR$(G%);"     "; ELSE PRINT"
  Gen:";STR$(G%);"     ";
  240 IF (C%(0)=S%*S% OR C%(1)=S%*S% OR
C%(2)=S%*S%) AND G%>0 THEN END
  250 C%(0)=0:C%(1)=0:C%(2)=0:G%=G%+1:EN
DPROC
```

```
  10 =    0 0   100 = 9FC3 8   190 = 9D17 E
  20 =    0 0   110 = A441 E   200 = 1605 5
  30 =    0 0   120 = 7AF5 3   210 = DFB4 D
  40 = 7054 4   130 = A45B 9   220 = 7282 7
  50 = C794 6   140 = 41B4 4   230 = DC9B 3
  60 = F9B8 3   150 = CB40 8   240 = 5C55 C
  70 = B14F 4   160 = ED0F 5   250 = 85CB 7
  80 = 4C60 9   170 = 10CF A
  90 = 94FC 6   180 = 4420 C
```



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endless cycle of patterns. The number of generations required to produce each of these cycles in grids of this type varies depending on the grid size.

- ● The final possibility is that the grid will never return to a single colour but will loop back to a pattern which has already been displayed somewhere along the line.

Thereafter it will continue to cycle in an endless repetition of this sequence of patterns. Once again the cycle period varies unpredictably, depending on the grid size being displayed.

Grid size four runs in a cycle of just three different patterns. Other grids which loop in this way are those of sizes 5, 13 and 14 which have cycles of 2, 14 and 15 respectively.

The results for grids of sizes 2 to 20 are shown in the table.

The next dimension

A further dimension can be added by introducing a third colour – say blue – and giving cells of this colour a value of two. Exactly the same principles apply as before except that when computing the values of the next generation of cells the totals must be reduced to modulo three.

The addition of this extra colour creates a completely new series of designs. As before, the outcome for any particular grid size is completely unpredictable – except by actually running the program and observing the outcome – but in the end the pattern will become either all-red or all-yellow, or it will form a repeating loop of patterns. Curiously, no all-blue grids have been found.

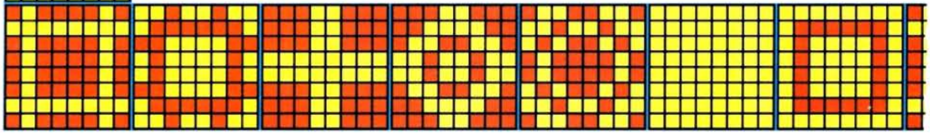
The sequence of patterns displayed on a typical three-colour grid (size six) is shown on the previous page. Here, 26 generations are required before the cycle loops back to an all-yellow grid. To observe the effect of the beauty of these patterns it is recommended that a grid with a long cycle period is run – for instance the size 15 grid with its display of 6,560 different designs.

Clearly there is no limit, in theory, to the size of grids which can be considered, but only those of 20 by 20 cells or less have been examined here. Larger grids need much greater amounts of memory in which to store the arrays and the time taken for successive generations to be computed also increases.

There is also the additional difficulty of displaying the results satisfactorily on the screen. Even so, there is still plenty of scope for investigating these smaller grids. For the mathematically minded, on a 20 by 20 grid, even allowing for its four-fold symmetry, there are no fewer than 515377520732011331036461129765621272702107522001 different possible designs!

The results of the three-colour grids of sizes 2 to 20 have also been included in the table. As can be seen, these vary even more wildly than the 2-colour patterns. Grids of size 15 and 16 each need several thousand generations before returning to an all-yellow pattern, but the next size up – grid 17 – resolves itself to an all-red pattern in just nine generations.

Outstanding among these results is that for grid 18, which produces a staggering sequence of 19,682 different designs before repeating the cycle. If you don't believe me then try it out for yourself but while observing this sequence be careful not to blink. If you miss a single display it will be an awful long time before it comes round again.



Grid results

Two-colour grids:			Three-colour grids:		
Size	Final Col	Sequence length	Size	Final Col	Sequence length
2	(Y)	1	2	(R)	1
3	(R)	2	3	(Y)	8
4	(L)	1, 4, 7, 10....(3n+1)	4	(L)	1, 2, 3, 4.......(n+1)
5	(L)	1, 3, 5, 7.....(2n+1)	5	(R)	3
6	(Y)	7	6	(Y)	26
7	(R)	4	7	(Y)	80
8	(Y)	7	8	(R)	7
9	(L)	2, 8, 14, 20...(6n+2)	9	(L)	1, 81, 161, 241..(80n+1)
10	(Y)	31	10	(Y)	242
11	(L)	2, 6, 10, 14...(4n+2)	11	(Y)	24
12	(Y)	63	12	(Y)	26
13	(L)	1, 15, 29, 43..(14n+1)	13	(L)	1, 27, 53, 79....(26n+1)
14	(L)	1, 16, 31, 46..(15n+1)	14	(L)	3, 27, 51, 75....(24n+3)
15	(R)	8	15	(Y)	6560
16	(L)	1, 16, 31, 46..(15n+1)	16	(Y)	6560
17	(L)	1, 15, 29, 43..(14n+1)	17	(R)	9
18	(Y)	511	18	(Y)	19682
19	(L)	4, 16, 28, 40..(12n+4)	19	(L)	1, 81, 161, 241..(80n+1)
20	(Y)	63	20	(L)	1, 79, 157, 235..(78n+1)

This table shows the results obtained with two and three-colour grids, sizes 2 to 20. The letter indicates whether the grid ends up red (R), yellow (Y) or forms an endless loop (L). In each case the number of generations required for this to happen is shown.

For the loops (L) a formula is given which calculates the sequence of generations producing identical patterns.

The value of n should be each positive whole number in sequence from zero upwards. The first four values in each series is shown. Using 0 in the formula gives first generation whose pattern will eventually be repeated.

Note the series 1, 2, 3, 4.. for three-colour grid four. This indicates a pattern which is self-generating in that it reproduces itself on each succeeding generation. Apart from an all-red grid, is this the only possible pattern that has this property?

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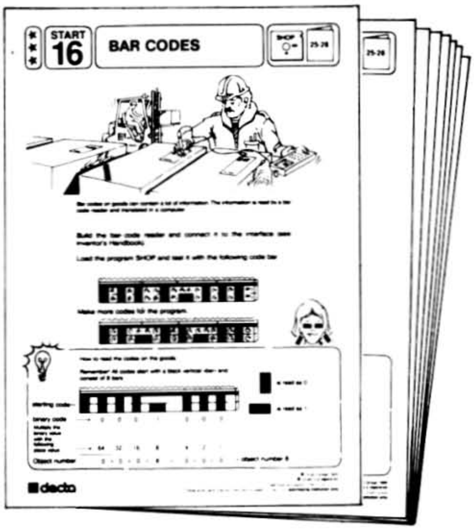
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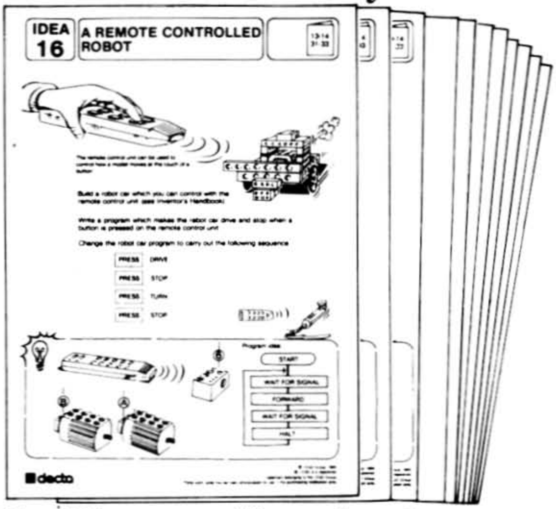
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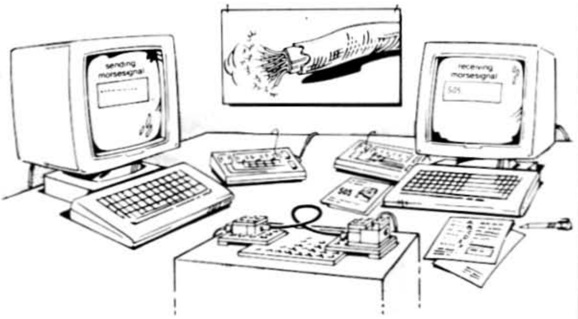
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- Fixing a micro beyond repair
- Body building supply problems
- Getting into animation
- ADFS guidance
- Linking up a robot

Three testers

I HAVE a number of problems I hope you can help me with. I'm trying to produce a chip testing program, I typed in one from Everyday Electronics but I can't get it to work properly and your help would be appreciated. I do have sideways ram.

Would a program written in BBC Basic work on an Electron or Acorn Atom? This may sound like a backward step but still...

I also need to produce four continually updated graphs on screen, one above the other, each monitoring one of the analogue ports. How would I set about it? – **R. J. Laycock, Saudi Arabia.**

● *Memory testing programs are difficult to write, because the program itself has to go somewhere and if the memory doesn't work it won't run. Even if you turn the program into a rom you'll still need some correctly working ram to operate in.*

Memory testing is most useful when the ram is split over several banks of chips, but the BBC Micro only has two banks. However, there is a diagnostics disc produced by Watford Electronics.

A program written in BBC Basic would probably work on the Electron, though you could pull a few tricks that the Electron wouldn't like. However a straightforward Basic program ought not to have any problems on any machine in the range.

The Atom uses a completely different version of Basic – it only has integers for a start, so compatibility is highly unlikely.

To plot four traces on screen from the A-D converters just read each value in turn, divide by 256 then add a constant offset of 256(CN-1). The x axis will be dependent on time, while the y axis will be the value you've just calculated. CN is the channel number, one to four.*

Buggy bombs out

I BOUGHT the Acorn Logo package a year ago and now my son wants to use the Buggy software supplied to operate a robot/buggy.

Could you tell me which outputs and functions are used? I have tried contacting Acorn who couldn't help but suggested asking Logotron, who were also unable to assist me.

I built an interface box from a design in an Osborn *Build a robot* book which works and I may convert it to Logo. Any further advice would be appreciated. – **G. B. Ford, Ipswich.**

● *Sorry, I don't think I can be of much help. The software will only drive Acorn's Buggy, which is fitted with sensors and motors wired to different input/output bits than other types. Unless you can make an exact copy of this hardware there is no way the software can work.*

As far as I know, Acorn never published the circuit of the Buggy so it's difficult to find out the information you need. Why not use your interface box and write a set of Logo routines to drive your own buggy. I'm sure you and your son will learn a lot by tackling a project like this

Disc difficulties

COULD you please help me with two separate problems that have recently occurred with my Archimedes 310. Sometimes when the machine is first switched on and a disc accessed I get:

```
Disc error 10 at :0/00000400
```

I know this is usually the result of a faulty disc, but it happens on any disc, so I assume it must be the computer in this case. After this has happened no other disc access command will work either.

Pressing Reset or Control+Reset doesn't help, but switching the machine off then on clears the fault completely.

The second fault is a faulty Caps Lock key – sometimes it works, sometimes it doesn't. I've tried cleaning the switch contacts, but it had no effect. Is it possible to replace the keys if they're broken? – **Ian Boulton, Moreton, Wirral.**

● *I had a similar fault on my Archimedes disc drives and cured it by removing the drive ribbon cable then re-fitting it – it was probably just a loose connection.*

As to the Caps Lock key, well it's an intermittent fault which makes it notoriously difficult to trace, so I'd just get it replaced at an Acorn-approved service centre.

MacConnectivity

I OWN a BBC A3000, but at school I use Apple Macintoshes. Is there any way I can get the Mac to read my Archimedes format discs? – **Scott Ashcroft, Edinburgh.**

● *The trouble with Macintoshes is that – unlike the rest of the popular computing world – their disc drives use variable speeds depending on the track being read. The early Macs cannot read ordinary*

➤

discs, but with the proper software Mac IIs can. Unfortunately I don't know of any software that will make a Mac II read an Archimedes disc.

However there are ways around this. Apart from direct connect using comms software, which is quite feasible, you could also upload on to some system such as MicroLink and then download on to the other machine.

Another system is to use MS-Dos as a communication medium: There's a Mac II utility called Apple File Exchange which will read and write MS-Dos discs. At the Archimedes end you can either use the PC Emulator with the GetFile and PutFile utilities or using DeskTop utilities such as !PCDir or !MultiFS.

Hopefully someone will come up with an expansion card plus variable speed disc drive for the Archimedes pretty soon so we can read and write Mac discs direct.

Video venture

I WOULD like to make a short animated video using toy cars, recording it on video frame by frame, digitising it and finally playing it back through my Archimedes A420/1.

I'd like to use the Brainsoft Multiple I/O card to do the digitising – but it takes two seconds for one frame. Would I need to have two seconds of video tape for each image or could I freeze frame each time?

I want to keep the final version as a compacted file using Delta Animator supplied with Render Bender – is this possible? What sort of playback time can I expect?

I'd like to record the finished product on to a video tape – which socket would I use and how do I connect it? – **Alexander Seeley, London.**

● *Your first problem is not really a problem at all – to digitise an image you should be able to plug your camera directly into the digitiser and take each frame as you move the objects around.*

There's no need to go via an actual tape – which would not be very successful anyway because of distortion caused by jitter on both freeze frame and ordinary playback.

However, the next stage is not as simple – the Delta Animator (or any other similar system) will not work on digitised images. You see, any digitiser introduces threshold noise of at least one significant bit, so between images of what seems to be the same object there is a low level difference between corresponding pixels that would prevent compression.

The only obvious solution I can see to this is to take each frame and then colour them by hand in !Paint or a more sophisticated art package like Pro-Artisan or Atelier. This way you can standardise the colours to make Delta Animator work, but you would lose realism.

This system could be automated to some degree using the appropriate software to perform edge detection to provide a monochrome image of where the colours change.

Realistic cartoons like Lord of the Rings were done by filming live action first and then colouring them in to form the animated images.

The playback image rate is dependent on many things: Screen mode, image size and the method of storage (disc or ram) being most important. However we are only talking about seconds for reasonable quality animation – remember you need 25 frames per second.

The finished sequence can only be recorded in black and white directly from the Archimedes as there is no PAL modulator built-in – use the video out from the computer to the recorders video in.

Going faster

I HAVE a BBC Master 512 which functions well but sometimes seems a bit stretched. Do you think it's worth upgrading or should I consider buying another machine? – **Michael Golby, Exeter.**

●*If speed is your main concern there's no point trying to push a machine that's at its limit. You'd be best going for an Archimedes, perhaps with an ARM3 upgrade.*

ADFS guidance

I HAVE been a BBC Micro fan almost since its inception and recently upgraded to a Master 128.

I am looking for guidance on the advantages of the ADFS filing system and the best way to use it including transferring programs and files from DFS. Are there any good books and if so where can I buy them. – **Jack A. Dunn, Sevenoaks, Kent**

● *There is the Advanced Reference manual by Watford Electronics this has a section on the ANFS (Advanced Network Filing system) and outlines the disc formats for the DFS and the ADFS. The simplest way of transferring between the two is to load the file into memory, swap over the filing system with the appropriate *command, swap the discs and then save the file under the new system.*

Taken to the cleaners

A FAULT has occurred on my BBC B that started when I re-asssembled my machine after cleaning it. Everything worked fine except it emits a high-pitched sound continuously, though the problem seems to be with channels two and three only. I replaced ICs 17 and 18 but it didn't help and the sound is driving me mad. Help.

Also I bought the Watford Electronics solderless rom board several months ago to increase my machine's rom capacity from 4 to 16. When I plugged in my 32k Sideways Ram Module I found it only gave me 16k – regardless of the socket I used. I'd appreciate any advice. – **Steven Bowen, Falmouth, Cornwall.**

●*Dealing with your sound problem first: Make sure you have properly reconnected the -5v supply – that's the purple lead at the left-hand edge close to the sound chips.*

You say the problem is with channels two and three, but don't say whether issuing sound commands to these channels alters or stops the sound. If it does then it's likely that the sound chip isn't getting initialised.

This could be due to a long rise time on the power rails due to a poor connection in one of the power connectors to the main board. But if not, the chances are that your system VIA (IC3) has developed a fault.

This problem illustrates the old adage: "If it ain't broken, don't fix it." Which in this case means that you shouldn't have cleaned your micro.

Due to the design in expanding of sideways rom sockets, each is only capable of addressing 16k so a 32k board will just not work – as you found. I doubt you'll find any easy way round it.

Mini-DIN?

I'VE just read the Body Building article about building a joystick for the Archimedes mouse port, and in it you mention the 9-pin mini DIN plug. Unfortunately I've been unable to track one down. Where can I get it? – **Paul Wrighton, Hull**

●*They are hard to come by – I know of a trade supplier but his minimum order is £50. However Musbury Consultants will let you have one for £1.50, which includes VAT and p&p. I believe that Watford Electronics also supply them already attached to a lead so that you don't have to try to solder it.*

Unfortunately there was an error in the article, the 74LS75 shown should have been a 74LS74. Also to prevent trouble from random switch–on states of this IC, pins 1 and 13 should be connected to the centre (Menu) switch.

This will ensure both flip-flops are in the same state and so the pointer will move in the correct direction. If they start off wrong pressing Menu will sort them out.

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Output made easy

Printers can be beasts when it comes to altering their style, but John R. Williams has ways of making them toe the line

PRINTER command codes are confusing. The basically simple idea that the device is set up to show off its various facilities by sending it certain non-printable characters is made difficult by the fact that there are so many different ways of doing it.

You could send characters, decimal numbers, hex numbers – by using the keyboard control characters, by using control characters in function key definitions, by VDU commands, or from spooled exec files.

How much simpler it would be if you could just do a star command in sort-of-English. Well, you can.

The VDU command is Basic's way of sending numbers to display devices, and it has a special facility for sending them only to the printer. This involves preceding each code by the number 1. To send the sequence of numbers 27,45,1 – which would turn on underlining on an Epson compatible printer – you could use the command:

```
VDU 2,1,27,1,45,1,1,3
```

The *2* at the start turns the printer on and the final *3* switches it off again.

A disadvantage of this method is that for a long sequence of commands you would be sending twice as many numbers, an extra one for each code sent.

Instead you could redirect the output to the printer only with an FX command and restore it to normal afterwards:

```
*FX3,2
VDU 2,27,45,1,3
*FX3,0
```

You can see how this shortens the VDU command. Unfortunately, it's only easy using Basic – other languages and applications make it harder, if not impossible.

We could spool the codes to give an exec file called UNDON, and each time we wanted to turn underlining on we could issue the command *EXEC UNDON. This would work fine, but it is a bit tedious to have to type *EXEC, or even *E. each time.

We really need machine code, accessible from any language by a simple star command.

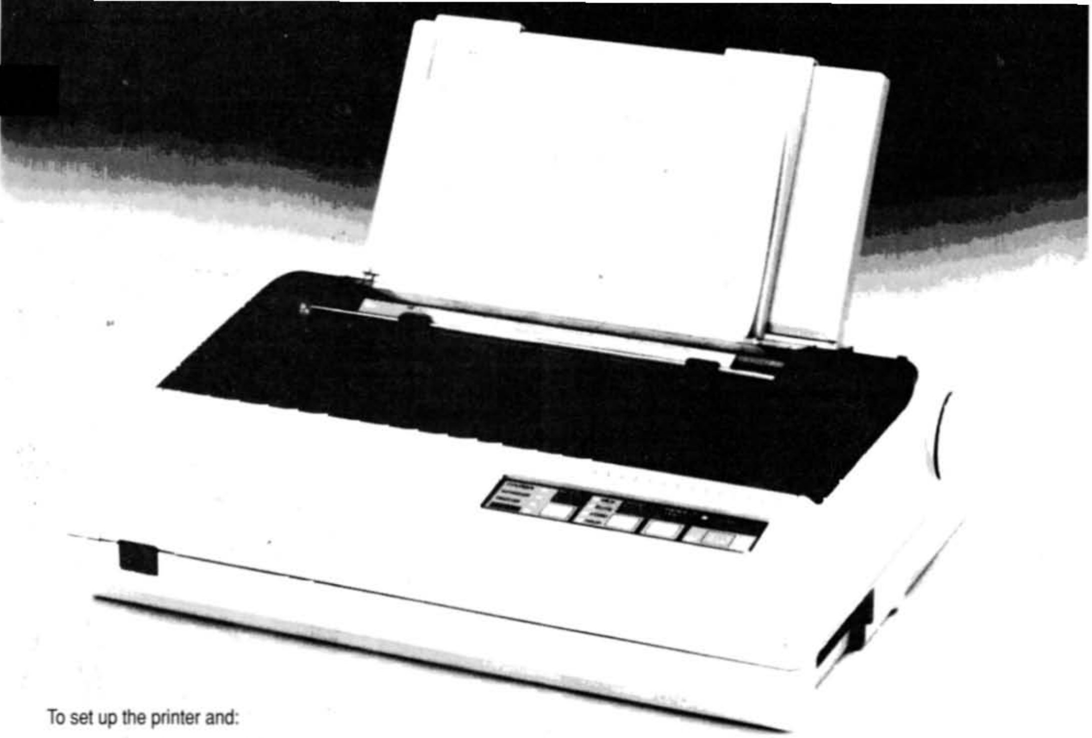
The solution

In fact, the way we've written our sequence of commands lends itself to easy translation into machine code. The FX instructions are *osbyte* calls and the VDU commands use *oswrch*.

The FX3 calls look a bit complicated on page 422 of the manual, but turns out to be easier in machine code, as the old value is saved in the X register and simply put back at the end. Also, adding 8 to the value enables the printer driver independently of the VDU 2/VDU3 commands.

The basis of the machine code to send our underline-on command would be like this:

```
LDA #03
LDX #10
JSR osbyte
```



To set up the printer and:

```
LDA #27
JSR oswrch
LDA #45
JSR oswrch
LDA #1
JSR oswrch
```

to send the codes in turn and finally:

```
LDA #03
JSR OSBYTE
RTS
```

which restores the previous printer state and exits the routine. There would be a longer middle section if there were more numbers to send.

The program

The listing is an assembler program which produces machine code like this from information about the printer commands held in data statements at the end.

The ones shown are Epson-compatible, but you may substitute your own titles – only seven letters maximum – and number sequences from your own printer manual. Each data statement ends with -1 as a marker to help the program know where it's up to.

When the program is run it creates and saves to disc a file for each data statement. These are individual machine code programs designed to run at &900 when their title is given as a star command. For instance, the first data statement shows the name *DRAFT*.

When the command *DRAFT is given, the program DRAFT is loaded to &C00 and executed, sending via the VDU drivers the numbers 27 and 64 to the printer only which resets an Epson-compatible printer to its "switch-on" condition, draft style printing.

The final data statement has the name TINY, and on my printer will switch to condensed superscript type – the tiniest available – and alter the line spacing to half normal.

You may find that you like to use a certain combination for a particular purpose, so work out your sequence and give it a name. I like to use double-strike enlarged condensed for song sheets – it's a bit bigger than normal and very clear.

For those familiar with using the assembler, only one pass is needed as there are no labels.

The files created can be called from disc as required. If they were stored on side 2 of a disc they could still be easily used if the library directory were set to that surface by a command:

```
*LIB :2.$
```

or from a second drive by substituting its number. The command could be included in the !BOOT file.

● *Controlling printers will probably never be easy while the manufacturers keep adding more and more features – most of which we never use. But at least using this system it's a little easier.*

```
 10 REM>B.PrCtrl
 20 REM by John R. Williams
 30 REM (c) The Micro User
 40 MODE7:*KEYOSA.$(PAGE+6)|M
 50 osbyte=&FFF4:oswrch=&FFEE
 60 REPEAT READ name$
 70 IF name$="***" END
 80 P%=&C00
 90 [LDA #3      \ Do FX3,10
100  LDX #10
110  JSR osbyte \ old value in X
120 ]
130 REPEAT READ C%
140 IF C%>-1 [LDA #C%:JSR oswrch:]
150 UNTIL C%=-1
160 [LDA #3      \ Restore old FX3
170  JSR osbyte
180  RTS:]
190 X%=&700:Y%=X%DIV256
200 $X%="SAVE "+name$+" C00 "+STR$~P%
210 CALL&FFF7:UNTIL FALSE
220 REM Data statements here in form:
230 REM name,code,code,..,-1
240 DATA DRAFT,27,64,-1
250 DATA DSTRIKE,27,71,-1
260 DATA SSTRIKE,27,72,-1
270 DATA ITALOFF,27,53,-1
280 DATA ITALON,27,52,-1
290 DATA BOLDON,27,69,-1
300 DATA BOLDOFF,27,70,-1
310 DATA ELITE,27,77,-1
320 DATA PICA,27,80,-1
330 DATA BIGON,27,87,1,-1
340 DATA BIGOFF,27,87,0,-1
350 DATA CONDON,15,-1
360 DATA CONDOFF,18,-1
370 DATA SUPON,27,83,0,-1
380 DATA SUBON,27,83,1,-1
390 DATA SSCROFF,27,84,-1
400 DATA RESET,27,64,-1
410 DATA TINY,27,72,27,83,0,27,51,18,1
5,-1
420 DATA ***
```

Get it right ✓

```
 10 =    0 0     150 = 5517 F     290 = DD16 A
 20 =    0 0     160 = 9F26 4     300 = 350C F
 30 =    0 0     170 = 8E7E 9     310 = 7131 E
 40 = 4EA6 6     180 = 88E3 5     320 = 9BD1 B
 50 = 2DD3 E     190 =  2D0 5     330 = E53D B
 60 = 6ACE C     200 = 59C6 1     340 = E1FE 0
 70 = 9D26 1     210 = 6C44 3     350 = 7390 F
 80 = D6E6 C     220 =    0 3     360 = DBB1 4
 90 = 9F26 B     230 =    0 3     370 = 5A8A 2
100 = 1C06 E     240 = BCAD A     380 = 1C0B 9
110 = 2A24 A     250 = 544C E     390 = E1E5 4
120 = 8B58 0     260 = 8405 E     400 = E4C1 D
130 = 7406 8     270 = FF84 E     410 = 917F 4
140 = 9972 5     280 = 19B8 C     420 = A685 A
```

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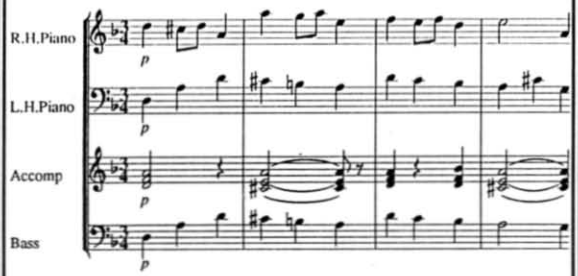

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Making IT work

Gerard Hailwood explores how information technology can be incorporated into schools

DESPITE what the National Curriculum says, all elements of IT are not yet widely available to most primary school pupils. I would suspect the difficulty is not lack of IT resources but rather that most teachers lack confidence in their ability to handle computers.

After all, the majority have never had any training in their use, they do not own one – and wish they would just go away. The National Curriculum, however, requires them to become involved. How do you, as an IT aware person, build confidence and encourage colleagues to make a start?

What you need is a sensible whole school IT policy to set out clearly what is expected and offer guidance on delivery. Such a document need not be of great length – the last thing teachers want at this stage is yet another tome. One side of A4 should be enough.

Let's start by looking at the basic requirements of IT in the National Curriculum, and remember that there are IT elements in Maths, Science and Language, as well as Technology.

IT can be broken down into five elements: Communication, Information Handling, Control, Modelling and the Application of IT. The first four need hardware and software, the last does not.

Communication usually involves the use of word processors, teletext emulations and art packages. Examples of software supporting this area are Folio, Easy Writer, Seafax and Typesetter.

Information handling involves the storage, manipulation and recall of a body of knowledge. Key, Quest, Find and Touch Explorer Plus are suitable packages for this part of IT.

Control will probably involve extra hardware, Lego Buggies, Valiant Roamer, Turtles, Bigtrak or any of the various buffer boxes.

Modelling would include spreadsheet software such as Grasshopper, but realistically packages where pupils can explore *worlds* or models within the computer are easier to cope with. The ever popular Granny's Garden, Droom or Suburban Fox would be possibilities here.

Application

Learning about the application of IT will come as pupils begin to realise where they have experienced some of its different facets in the outside world. When you order a hamburger in a fast food establishment, is the person taking your order using a Concept keyboard linked to a database? The world is full of examples that a teacher can use.

If teachers find it hard to become involved with a wide range of software to support their work, it makes sense to build your policy around a very small core of packages. The IT-reluctant is going to be more prepared to become familiar with, say, one package per element than with a number.

Of course, these four packages need to be selected very carefully. They should be context-free if possible and offer a range of features that can be revealed progressively as pupils move up the school. Also in these days of LMS they need to be either cheap or already available.

An excellent choice for communications would be Folio. There can be few schools that do not have this versatile word processor. It can be used at all levels in a primary school: Reception can write simple sentences, with or without a Concept keyboard. At the other end the full facilities, the different fonts and print options can be used for desktop publishing. It's just one package for the teacher to learn with applications across the curriculum.

Most schools will have a database of some kind which they can use for information handling. Junior Find has a range of options which lets you customise the program to suit a wide range of pupils. The latest version allows use of the Concept keyboard. There are many facilities that will enable that one database to be used throughout a school.

Control needs extra hardware. If your school has not yet invested in control hardware careful thought is needed before you make your choice. The various buffer boxes with connections to a range of sensors and motors are generally very good.

There is, however, a vast amount to be learned and many of the concepts involved with programming these devices could be beyond younger children. As an initial investment the Valiant Roamer is a good choice as it can be used at various levels throughout a school.

Modelling, or using the computer to explore worlds within the computer, is already carried out in many schools. One plus for this kind of package is that most do not call for initial instruction from the teacher. Provided the software is integrated into other classroom work, most can be passed to the children to explore on their own.

There is no need to throw away software the school already possesses. Decide which of the four elements each fits into and use it when appropriate - but don't overwhelm everybody with it as part of a policy. You will find that as IT becomes more established in school you will have requests for other software to fit an expanding need.

IT in use

Having selected the software your policy should indicate how you intend to support colleagues in its use by training and day to day trouble shooting.

Every year each school is given a grant for in-service training. This can perhaps be best used by buying in supply teachers so that colleagues can have time on their own to become familiar with the software. It may be possible to link this with a visit from your LEA IT Advisory Teacher who could give other assistance in relating IT to your curriculum needs.

Time spent away from the pressures of the classroom doing something useful is always welcomed. It is learning the ins and outs of software that many teachers find difficult or simply too time consuming. If your INSET grant is already earmarked there are always the B-Days, when you could put on your own training sessions.

One of the main problems lies in what to do when a teacher comes across a difficulty which he or she cannot solve simply. These are often of the *I've forgotten which key to press to get it to print* kind.

You should either promise to go and sort things out at the next break, or send a note with suggestions immediately. This kind of instant response helps to build confidence, especially if the computer doesn't need to be turned off and work can continue.

Many primary schools operate a rota system for their machine, but this often results in expensive resources being underused or not used at all at certain periods. A much better system is one that allows the teacher to book the micro for a specific period.

If you have several computer systems the ability to book more than one at a time can have added benefits. Using one computer with say, a database, and another with a word processor at the same time for a specific project will increase the cross curricular awareness of IT.

Deploying resources

How you deploy resources should be part of your IT policy – though obtaining them can be a greater problem. However, if you don't use what you've got you will not get any more.

When you do do something worthwhile with IT let the world know. Once you start a public relations exercise it is surprising where the money will come from.

Start with the parents. Arrange a session for them to have a go with your chosen packages – they often feel quite left out where IT is concerned. Once you have gained their interest you can start to point out your problems.

An excellent way to publicise your work is to publish a school newspaper using your IT facilities. If you distribute this around your LEA advisors, newspapers, local industries and shops, sponsors often come forward of their own volition.

Links with industry can often be very worthwhile. As long as what you are publishing is part of your everyday work this involves you in very little extra effort. However, you do need to make a long term commitment here – one-off newspapers rarely have any effect on the school's bank balance.

Special needs

Any sensible IT policy will need to cover pupils with special educational needs. If you have selected your software packages carefully these children can be accommodated within the range of available facilites. It may be that you will need to make greater use of Concept keyboards.

Finally, set a time scale for the full implementation of your policy. Set a realistic target and try to stick to it.

Provided you have chosen your software well, and support your colleagues by providing training and time to become familiar with what you are offering, confidence will grow, and IT will lift off in your school.

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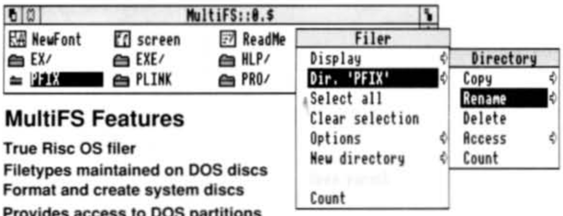

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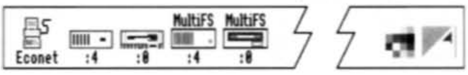

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WHILE I've covered most aspects of computer control I have mainly used Basic and machine code, although the Experimenter's Board (August 88 to May 89) did show how to use Forth as well as Basic.

In keeping with the educational theme of this issue I thought I would look at using one of the most popular educational languages, Logo. This proved a little more tricky than I first thought.

Logo, with its famous turtle, is mainly thought of as a graphics language. Incidently, the turtle got its name from the inventer's wife's maiden name – honestly.

In fact there is more to Logo than turtles, and the language can best be described as a cross between Forth and Lisp.

The vital component for hardware control is the ability to access specific memory locations directly. In most versions of Basic this is done with PEEK and POKE commands, but in the BBC version it is achieved more elegantly with the indirection operator – denoted by a question mark.

Logo has its equivalent in .EXAMINE and .DEPOSIT, the syntax used in Logotron's version. BBC Logo has the same words but without the prefixing full stop.

As it is the most widely used version, I will use the Logotron syntax throughout this article. Remember to modify this if you have the other version.

Now we have to know what numbers to use with these words. To use .DEPOSIT we have to know the address to use and also the number to store there. Unfortunately Logo only lets us specify numbers in base 10, which is less convenient when dealing with bit patterns than hex or base 16.

A further complication is that the BBC version will only accept the address as a signed 16 bit integer. So to access the user port (which is really at address &FE60) we have to use the address -416. This is because the most significant bit is used to indicate the sign of the number.

The number itself is created from the *two's complement* of the bit pattern. This is simply the *one's complement* plus one – which isn't much good if you don't know what the one's complement is! But help is at hand, the one's complement is simply the inverse of the bit pattern. So swop all the zeros for ones and all the ones for zeros. You can see the process summarised in Figure I.

Having sorted out the address, we now want to know what number to use. First of all we must tell the user port which bits will be used as inputs and which as outputs.

The bit pattern controlling this is stored as follows: One means it is to be an output and a zero means it is an input. Just remember that a 1 looks like an I for input and a 0 looks like an O for output – then remember that this would be all too simple so it is the other way round. Figure II shows how we calculate the number to make three inputs and five outputs. Now to set the outputs to any required state all we have to do is calculate the number and deposit it in the data register. For example, suppose we want to turn all the bits on then we would use: .DEPOSIT -416 255. 255 is the decimal equivalent of the bit pattern for all ones.

If we try this with the user port configured in Figure II we would only affect those bits we had designated as outputs. The bits we make inputs would not be affected.

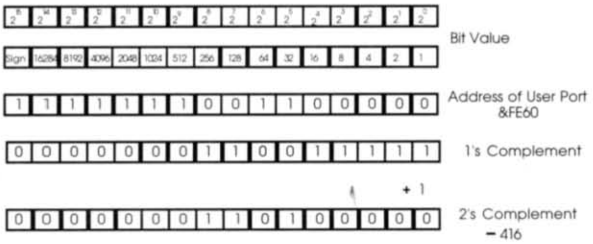
To look at the value on the user port we would use PRINT .EXAMINE -416. We need the PRINT statement to do something with the number returned.

If we then look at this number and break it down into its bit pattern you will see the bits we turned on as being ones and the input bits reflecting the current logic levels at the user port input.

This is all very well if we want to specify the whole of the bit pattern at once, however often each bit is controlling something different.

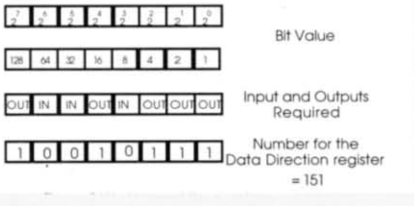
For example, if you made a buggie you might have a bit controlling the left motor, another for the right and one more for a pen solenoid. Then you might have one input bit for a right whisker switch, another

➤



2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}	Bit Value
Sign	16284	8192	4096	2048	1024	512	256	128	64	32	16	8	4	2	1	
1	1	1	1	1	1	1	0	0	1	1	0	0	0	0	0	Address of User Port &FE60
0	0	0	0	0	0	0	1	1	0	0	1	1	1	1	1	1's Complement
															+ 1	
0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	2's Complement − 416

Figure I: Working out the address



2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}	Bit Value
128	64	32	16	8	4	2	1	
OUT	IN	IN	OUT	IN	OUT	OUT	OUT	Input and Outputs Required
1	0	0	1	0	1	1	1	Number for the Data Direction register = 151

Figure II: Working out the number

➤

for the left and a third for a photo detector.

The upshot of this all is that at various stages of the program you would want to change one bit and leave the others unchanged, or you will want to look at one sensor and not have to bother with the state of the others. This would normally be impossible because the IF statement, the major decision maker, will only deal with these bit patterns when lumped together into numbers. The way to get round this is to use the logical operators AND and OR, to isolate the bits you want. This is what I normally do in Basic, but when I tried it in Logo I was in for a shock.

Although Logo has these operators, they will not work with ordinary numbers, only with Boolean values. So on the face of it there would seem no way of effective control.

However a missing operation in any language worth its salt could always be derived from the available operations, so I set about seing if I could derive them.

The results are shown in Listing I. These provide you with simple-to-use control words that can be incorporated into any control program. See also Table 1 for a summary of the words and what they do.

The heart of the program is the DOR - standing for DataOr – which takes in two numbers and returns their logical OR. This involves testing each bit of both numbers and making the corresponding bit in the output one if either bit is one.

Testing a bit is a little complicated: Suppose we want to test the least significant bit of a number. If we divide the number by two, take the integer (whole number part) and then multiply it by two it will be the same as the original number if the least significant bit was zero.

If, however, the least significant bit was a one, the numbers would not be the same. Now to examine the next least-significant bit we divide the numbers by two again and repeat the process. This is continued for all eight bits in the word DORP standing for Data OR Primitive.

As Logo makes no provisions for accessing a loop counter, this has to be a recursive function. It makes use of MakeMask which returns a logic one in the bit position passed to it – simply two to the power of the bit number.

Logo Control Words from Listing 1

MakeInput n	Makes bit n on the user port an input
MakeOutput n	Makes bit n on the user port an output
MakeMask n	Returns a number with a logic one in bit position n
DNOT n	Returns the logical inverse of n
DOR n1 n2	Returns the logical OR of n1 and n2
DAND n1 n2	Returns the logical AND of n1 and n2
ONBIT n	Turns bit n on (bit must previously have been made an input)
OFFBIT n	Turns bit n off (bit must previously have been made an input)
LOOKBIT n	Returns TRUE if bit n is seeing a logic one or FALSE if bit n is seeing a logic zero

Having gone through all that rigmarole for the OR operation, you might think we would have to go through a similar procedure for AND. Fortunately an OR along with a NOT function can be used to create any logic function in the world. In fact fundamentally your whole computer is composed of these two simple operations.

To achieve the NOT or inverse of a number is simple if we restrict ourselves to 8 bits – simply subtract the number from 255. Then the AND can be made by inverting each number, ORing them together and finally inverting the result.

The net result is that you can have a complete set of easy to use words both for initialising the user port, controlling the bits and reading the inputs. The only slight problem, however, is the speed. The basic OR function is not very fast, taking just over a second to complete. This will limit the response of any controlling program. If speed is vital you will have to sacrifice the flexibility and simplicity of single bit control and resort to using pure numbers as we showed before.

Now having got access to your user port from Logo you need a simple way of connecting to it. This can be done with Body Building Pack 1 – the transition board and Pack 2 the connecting cable, which is used in so many of my articles.

● Next month I'll dispel the mystery that surrounds connecting up a SCART plug.

```
TO MakeMask :Bit
MAKE "Mask 1
IF :Bit = 0 [STOP]
REPEAT :Bit [MAKE "Mask :Mask * 2]
END

TO MakeOutput :Bit
MakeMask :Bit
MAKE "DDR .EXAMINE -414
.DEPOSIT -414 DOR :Mask :DDR
END

TO MakeInput :Bit
MakeMask :Bit
MAKE "Mask DNOT :Mask
MAKE "DDR .EXAMINE -414
.DEPOSIT -414 DAND :Mask :DDR
END

TO LOOKBIT :Bit
MakeMask :Bit
MAKE "PDR .EXAMINE -416
MAKE "LBIP DAND :Mask :PDR
IF :LBIP = 0 [OP FALSE] [OP TRUE]
END

TO DAND :A1 :A2
OP DNOT DOR DNOT :A1 DNOT :A2
END

TO DNOT :A1
MAKE "A1 255 - :A1
OP :A1
END

TO OFFBIT :Bit
MakeMask :Bit
MAKE "PDR .EXAMINE -416
.DEPOSIT -416 DAND DNOT :Mask :PDR
END

TO ONBIT :Bit
MakeMask :Bit
MAKE "PDR .EXAMINE -416
.DEPOSIT -416 DOR :Mask :PDR
END

TO LSB :A1
IF :A1 = ( ( INT ( :A1 / 2 ) ) * 2 )
[MAKE "VOB FALSE] [MAKE "VOB TRUE]
END

TO DORP :A1 :A2 :T
IF :T = 0 [STOP]
LSB :A1
IF :VOB = FALSE [LSB :A2]
IF :VOB = TRUE [MakeMask ( 8 - :T ) MAKE
"ORES :ORES + :Mask]
MAKE "T :T - 1
MAKE "A2 INT ( :A2 / 2 )
MAKE "A1 INT ( :A1 / 2 )
DORP :A1 :A2 :T
END

TO DOR :A1 :A2
MAKE "ORES 0
DORP :A1 :A2 8
OP :ORES
END
```

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Watford's Hard disc drives for A310 & A410 series fit internally into the space provided. The 'simple to follow' fitting instructions supplied makes drive fitting very easy. All disc drives are self parking. 40Meg & 53Meg drives are fast 24mS type.
P.S. A310 upgrades require a backplane and a fan.

● 3HDP – Hard Disc Podule only	£175
● 3HD20 – 20Meg H' Disc + Podule for 310	£319
● 3HD40 – 40Meg H' Disc + Podule for 310	£439
● 4HD20 – 20 Meg Hard Disc for 410	£169
● 4HD40 – 40 Meg Hard Disc for 410	£285
● A3000 Hard Disc Podule only	£195
● A3000 20 Meg Hard Disc + Podule	£369
● A3000 40 Meg Hard Disc + Podule	£489

(Carriage £7)

SILICON VISION Corner

Data Vision	£74	Film-Maker	£59
Gerber Plot	£93	Office Tools	£219
Risc Basic	£74	ROBO LOGO	£54
Solid CAD	£74	Share Holder	£74
Super Plot	£20	Solids Render	£59
Super Dump	£20	Solid Tools	£199

Arc PCB Professional	£275
Realtime Solids Modeller	£110

LANGUAGES (Archimedes)

ISO-PASCAL; FORTRAN 77	£89 each
ANSI C Release 3	£129
Assembler; LISP or Prolog X	£155 each
LOGOTRON LOGO	£55

ROBO LOGO	£54	TWIN EDITOR	£25
RISC BASIC	£85	BASIC Compiler	£89

(P&P £2 on above packages)

Desk Top Publisher

Acorn's Archi DTP Package	**£125**
Impression DTP Package	**£135**
Impression 2 DTP Pack	**£165**
Impression Junior	**£79**
Tempest DTP Package	**£99**

ARCHI WORDPROCESSORS

Wordwise + Disc	£20	P.Spellchecker	£40
Image Writer	£25	View	£45
Interword Disc	£20	Viewspell	£32
1st Word Plus – 3	£72	Viewindex	£12
Archie Spell Master	£39	Graphic Writer	£23

DATABASES

AlphaBase	£36	Interbase Disc	£20
Knowledge Organiser	£45	Multistore	£195

SPREADSHEETS

Intersheet Disc	£20	Viewsheet	£45
Sigmasheet	£55		

BUSINESS GRAPHICS

GammaPlot	£50	Interchart Disc	£20

INTEGRATED PACKAGES

Logistix – Database, Spreadsheet, Time Management & Business Graphics	£89
Pipedream 3 – Wordprocessor, Database & Spreadsheet	£125

(P&P on above £2)

GRAPHICS, ART, DESIGN & GAMES

GRAPHICS			
		Hyperpack (12)	£79
Atelier	£84	Hoverbod	£11
Artisan II	£59	Ibix the Viking	£14
Pro Artisan	£85	Inter Dictor	£25
Autosketch II	£75	Jet Fighter	£10
Graph Box	£64	Man at Arms	£17
Kermit	£46	Minotaur	£11
Render Bender	£59	Missile Control	£11
Euclid 2	£57	Mogul	£14
		Olympics	£17
GAMES		Orion	£12
Alerion	£11	Pacmania	£14
Apocalypse	£25	Repton 3	£17
Arcade Soccer	£17	Sporting Triangles	£24
Bug Hunter	£14	Talisman	£14
Battle -Tank	£14	The Pawn	£19
Clares 3 Pack	£12	Thundermonk	£11
Conqueror	£19	Zarch	£15
Enthar Seven	£22	**Miscellaneous**	
E-Type	£17	Armadeus Sound	£69
E-Type Designer	£15	DFS Reader	£15
E-Type Extra 100 miles	£18	Toolkit (Clares)	£42
Freddy's Folly	£10	Hearsay Comms Pack	£55
Holed Out Designer	£17	Arccomm Pack	£29
Holed Out Golf	£17	Genesis	£65

Archimedes to BBC Serial Link Mk 2

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers.

New RISC OS Version **Only £15**

Archimedes 5.25"/3.5" Disc drive Interface

With this interface it is possible to connect almost any 5.25"/3.5" disc drive with its own power supply to the Archimedes. Upto 4 disc drives can be connected. NO SOLDERING is involved. Supplied complete with necessary lead.

Only £21

MINERVA's Archimedes Software

Sigmasheet	£55	Sales Ledger*	£53
Home Accounts*	£40	Purchase Ledger*	£53
Stock Manager*	£53	Reporter	£29
Nominal Ledger*	£53	Mailshot*	£29
Ancestry	£59	MultiStore	£195
Gammaplot	£50		
System Delta+	£55		
System Delta + Reference Manual			£25
Order Processing/Invoicing*			£53
School Administrator			£118

** Requires System Delta*

Watford's Summer Sale

Many customers have asked why Watford does not have a Summer Sale. As we could see no reason why we should not, for once we are having a truly spectacular sale with some of the lowest prices you have probably ever seen.

ARCHIMEDES ADD-ONS

● Archi Real-time Digitiser			£199
● SCSI Adaptor Expansion Card			£175
● Dual RS232 Podule			£195
● Archi Graphic Tablet			£210
● Archi Mk II Hand Scanner			£129
● A3000 Hand Scanner			£169
● Archi Mk II Spare Mouse			£34
● Logistix	£85	● Pipedream 3	£112
● Atelier	£79	● Artisan II	£55
● Euclid 2	£54	● Render Bender	£55
● Robo Logo	£49	● Solids Render	£54
● A3000 RAM Upgrade to 2Meg			£70
● A3000 RAM Upgrade to 4Meg			£245
● 2MB RAM Upgrade – A310			£245
● 4MB RAM Upgrade – A310			£449
● 2Meg RAM & 20Meg H/Disc – A410			£232
● 4Meg RAM & 20Meg H/Disc – A410			£379
● 4Meg RAM & 20Meg H/Disc – A410			£472
● 4Meg RAM & 40Meg H/Disc – A410			£525
● A3000 20 Meg Hard Disc Drive			£359

BBC B & MASTER ACCESSORIES

Master ROM Cartridges Twin	£8;	Quad	£12
● DFS Kit	£59	● Rom Manager	£18
● VIEW 3.0	£42	● DDFS Mk 2 Kit	£42
● View Store	£33	● View Sheet	£34
● Disc Doctor	£20	● Over View	£60
● Inter Word	£34	● Inter BASE	£44
● Spellmaster	£39	● Wordwise +	£34
		● Word Aid	£20
● Quest Mouse Mk 2 & Quest Paint			£54
● AMX Mouse Mk3 & Superart			£54
● Quest Paint	£29	● Conquest	£27
● Wapping Editor	£49		
● Wapping Editor with Mouse			£69
● Solderless Sideways ROM Board			£32
● User Port Splitter Unit			£20
● Sideways ROM ZIF Socket			£16
● B-32 Shadow RAM Card			£55
● B-12 Sideways ROM Board			£33
● 32 Shadow RAM Expansion Card			£55
● ROM/RAM Card 32K			£44
● ROM/RAM Card 128K			£99
● Beeb Video Digitiser			£99
● Beeb Hand held Scanner			£125

DISC DRIVES

● CLS400S	£69	● CS400S	£79
● CLD800S	£139	● CD800S	£149
● CLS35	£62	● CLD35	£109

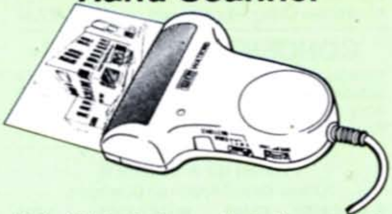
MONITORS

● Microvitec 1431	£165;	1451	£205
● Philips 7502	£68;	CM8833	£199
● TAXAN 775+	£396;	EIZO 8060H	£379

PRINTERS

Panasonic KX-P1081	£120;	KX-P1180	£129
Panasonic KX-P1124	£205;	KX-P1624	£325
Panasonic KX-P4420	£899;	KX-P4450	£1225
Integrex Colourjet 132 Printer			£475
Star LC10	£127;	LC10 Colour	£165
Epson LX400	£127;	Epson LQ400	£194

Archi Mk II Hand Scanner



Watford Electronics is now able to offer a complete hand held scanning package, possibly the most essential addition to any desk top publishing system. The package includes the most comprehensive utility software available for the Archimedes, a high quality, ergonomically designed to fit the shape of your hand, (see drawing above) scanner, which is fitted with a warning LED that will indicate if the scanner is being moved too quickly for accurate results. Additional twin guide rollers ensure precise tracking over the image, to make the best use of the high resolution available with this sytem. The yellow/amber illumination of our Mk II scanner, enables you to achieve optimum accuracy. It is capable of scanning upto an amazing 400 DPI. The scanning area is 4" wide and the height is only limited by the maximu amount of memory available.

On board ROM software supplied, is the most sophisticated Archimedes scanner software yet written.

AHS-4	**Archi 300/400 Version**	**£149**
AHS-3	**Archi A3000 Version**	**£175**

Z88 Portable Micro

Only: **£195** (Carr £4)

FREE

With every Z88 purchased from us, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

ACCESSORIES

● 32K RAM Pack or 32K EPROM Pack			£18.00
● 128K RAM Pack or 128K EPROM Pack			£45
● 512K RAM Pack			£175
● Z88 Eprom Eraser Unit			£35
● Z88 Spellmaster for Pipedream			£51
● Z88 Carrying Case			£9
● Z88 Computing Book			£9.95
● AA Nicad Rechargeable Battery			£1.50
● Battery Charger Compact & Fast			£6
● Z88 Serial Printer Cable			£9
● Z88 Parallel Printer Cable			£25
● Z88 to Archi Link			£15
● Z88 to BBC Link	£20	● Z BASE	£56
● Z88 to PC Link II	£30	● Z TAPE	£42
● Z88 to Macintosh	£52	● Z TERM	£42
● Z88 Mains Adaptor	£9	● Z88 Modem	£149

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

By popular demand, we are now supplying refurbished and fully guaranteed BBC Micros with Disc Filing System
(Please telephone for price & availability)

ULTIMUM – Archimedes A3000 Podule Racking System

When Acorn originally designed the Archimedes micro, they released to all interested parties the specification of the expansion podule. This has now become the accepted standard for all manufacturers of Archi peripherals. The A300 & A400 both allowed expansion internally up to 2 or 4 podules. However, a newcomer to the affray has caused some upset. A3000 has only a single podule expansion slot, on the outside. There has been deliberation in the industry about a controversial "mini-podule" to be fitted to a special rack. This would entail a re-design of all the available podules onto a smaller board and understandably the manufacturers have rejected the idea completely. As always, Watford have come up with the only real solution to the A3000 expansion problem. The Ultimum Podule Racking System allows up to 3 full size standard A300/A400 series podules to be fitted to the computer. There is also provision for a hard disc drive and podule. Ultimum has its own PSU. There is also an IEC mains output socket for a monitor. It mounts on top at the rear of the computer, and allows direct access to the floppy drive and reset button, rather than obstructing access as on other non standard systems.

Watch this space for launch details.

BBC MASTER

MASTER 128K Micro incl. Acorn's View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus FREE OFFER (see below) **£399***(carr £7)*

FREE OFFER

A 5.25" Double Sided, 40/80 track switchable 400K Disc Drive complete with cables and a Utilities disc incl. 2 games, plus

Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control.

FREE with every BBC Master purchased from us during August

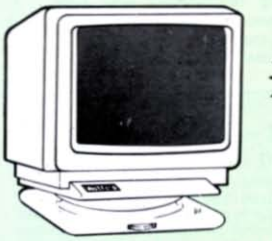
ADD-ONs & ACCESSORIES

Turbo 65C102 Add-on Module			£115
Econet Module for the Master			£47
Twin ROM Cartridge for Master			£9
Quad ROM Cartridge for Master			£14
Master Reference Manual I			(No VAT) £14
Master Reference Manual II			(No VAT) £14
Master Advance Ref Manual			(No VAT) £17
64K Upgrade Kit for B+			£32
Acorn 1772 DFS Kit complete			£49
ECONET Upgrade Kit for BBC B			£42
ALL ECONET UPGRADES Available			
ARIES' IEEE Interface for BBC B & Master			£238
Morley Teletext Adaptor with ATS Rom			£99
Filestore E01S	£899	Filestore E40s	£749
Filestore E60S	£949	Ecolink	£270

(Carr. £2 to £7 depending on the weight)

Continued→ → → → → → → → →

MONITORS



12 months FREE maintenance on site

MICROVITEC 14"

● **1431** – Standard resolution as used on the BBC television computer programme	£175
● **1451** – Medium resolution, suitable for word processing in mode 0	£219
● Cub3000 Medium Res for A3000	£195
● **1455** – MS Medium resolution, ideal for Archimedes	£220
● **1441** – High res, exceeds the capabilities of the BBC Micro	£359
● **1431AP** RGB + PAL and AUDIO	£199
● **1451AP** RGB + PAL and AUDIO	£255
● **2030 CS** 20" Med Res	£380
● **2040 CS** 20" Hi Res	£675
● Dust Cover for Microvitecs	£5.50
● **Touchtec 501 Touch Screen**	£239

14" MULTISCAN COLOUR

● **TAXAN** 775 Plus – 0.28 Dot pitch Ultra high resolution, anti-static screen	£429
● **TAXAN** 770 LR Low Radiation, auto-scanning Ultra High Res	£429
● **TAXAN** Multiscan 870 16" Monitor	£575
● **EIZO** 8060H – For technical info. read the review in Micro User, Jan. '89	£389
● **EIZO** 9060SZ Low Radiation, Super High Resolution, Antistatic screen, multiscan monitor for a wide range of applications. 800 dots x 600 lines. Display for high res VGA. 0.28 Dot pitch	£429

- **TAXAN** Super Vision 3 – High Res 12" Colour Monitor/with green screen switch for wordprocessing
  Special Offer **£179** (While stocks last)

PHILIPS

● **BM7502** 12" Hi-res Green Monitor	£70
● **BM7522** 12" Hi-res Amber Monitor	£71
● **CM8833** 14" Med. Res Colour Monitor	£215

STAR BUY

- **PHILIPS** 14" Medium Res, dark glass, attractively finished Colour Monitor . A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £189

- **PHILIPS 14"** Refurbished monitor, same as above at a special offer price Only **£120**
  (Offer valid while stocks last)

Dust Cover for Philips Monitors **£6**

(Securicor carriage on Monitors £7)

SWIVEL BASES

By simply placing your monitor on one of our front adjustable professional swivel bases (see drawing at the top), you can easily adjust the viewing angle.

for 12" Monitors **£8** (carr. £2.50)
for 14" Monitors **£12** (carr. £2.50)

Anti Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for wordprocessor users.

£12

Spare Monitor Lead

BNC Lead for Zenith or Philips	£3
Skart Monitor Lead	£5
RGB lead for TAXAN Monitors	£3
Archimedes Colour Monitor Lead	£7.50

CONCEPT KEYBOARDS

Standard A3 Keyboard with BBC Software	£143
Standard A4 Keyboard with BBC Software	£117
Archi A3 Keyboard	£144
Archi A4 Keyboard	£118

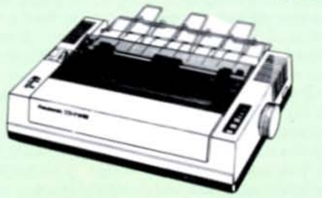
Roland Plotters

(Official Roland Appointed Distributor)

● **DPX 2500**	£2495	● **DXY 1100**	£595
● **DXY 1200**	£835	● **DXY 1300**	£1015

Panasonic KX-P1081

12 MONTHS FREE MAINTENANCE ON SITE



SALE OFFER only: **£127**

(Price includes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every KX-P1081 printer purchased from us)

KX-P1180 Printer Offer

Panasonic KX-P1180 printer, Dump Out 3, Screen Dump ROM & a BBC printer lead.

Offer Price £136

Panasonic Printers

● **KX-P1124** 24pin 80col. 192/63 CPS	£215
● **KX-P1540** 24pin 136col. 240/80 CPS	£415
● **KX-P1592** 9pin 136col. 216/45 CPS	£275
● **KX-P1595** 9pin 136col. 288/61 CPS	£345
● **KX-P1624** 24pin 132col. 192/63 CPS	£349
● **KX-P1640**	£349
● **KX-P1695** 9pin 132col. 330/86 CPS	£349

- **Panasonic KX-P4450i** LASER PRINTER
  Latest technology at Watford's special offer price **£1,225**

● Spare Toner	£29	● A4 Feeder	£55
● Drum Unit	£149	● Developer	£115

Panasonic Accessories

Cut Sheet Feeders

KX-P1592/1595 (P32)	£175	KX-P1540 (P35)	£175
KX-P1124 (P36)	£85	KX-P1180 (P37)	£79

BUFFERS

P12	4K buffer Board for 1081	£55
P42	32K buffer Chip for 1592/1595	£16
P43	32K Buffer Chip for 1540/1124/1180	£16

Serial Interfaces

P17	P1081/1592	£32	**P19** P1124/1180	£55

Original Panasonic Ribbons

Guaranteed to last 3 million characters

P110	for KX-P1081, 1592 & 1595	£8
P115	for KX-P1180	£8
P145	for KX-P1124	£8
P140	for KX-P1540	£10

Colour Ribbons for KX-P1081, 1592 & 1595
Brown, Blue or Red **£9.95 each**

NEC PINWRITER

NEC P2+ Pinwriter			£219
NEC P6+ 80 colm	£329	P7+ 136 colm	£429
Colour Option	£74	Serial Interface	£73
Cut Sheet Feeder	£125		

NEC Ribbons for P6+ **£8.50**; P7+ **£9.50**

INTEGREX COLOUR JET

● Colour Jet 132 Printer	£515
● Paper Roll	£6.50
● Screen Dump Software	£10
● Colour Cartridge	£19.50
● Colour Textile Cartridge	£29
● Black Cartridge	£11.25
● Black Textile Cartridge	£17
● 100 A4 OHP transparencies	£55
● 8K Serial Interface Optional	£123

Citizen Printer

120D Plus	£105	Swift 9	£198
Prodot 9	£275	Prodot 24	£375
Swift 24	£245		
Swift 24 Colour Option			£34
Swift 24 Colour Ribbons			£13

Hewlett-Packard Printers

12 MONTHS FREE MAINTENANCE ON SITE

HP Desk Jet +	£549
HP Desk Jet Cartridge	£14
HP Desk Writer	£669
HP Laserjet IID	£845
HP Paint Jet Colour	£699
HP Quiet Jet Plus	£425
HP Scanjet Plus	£1199
HP Thinkjet	£269

Star Printers

● LC10 9pin 80col. 144/36 CPS	£124
● LC10 Colour 9pin 80col. 144/36 CPS	£160
● LC10-II 9PIN 80col. 180/45 CPS	£155
● LC15 9pin 136col. 180/45 CPS	£258
● LC24-10 24pin 80col. 180/60 CPS	£189
● LC24-15 24pin 136col. 200/67 CPS	£320
● XB24-10 24pin 80col. 240/80 CPS	£379
● XB24-15 24pin 80col. 240/80 CPS	£489
● XB-24 Colour Kit	£35

Star Accessories

Cut Sheet Feeder

LC10/LC24-10	£65	LC15/LC24-15	£125
XB24-10	£80	XB24-15	£139

Serial Interfaces

SPC-10	LC10; LC10-II; LC10-Col; LC15; LC24-10; LC24-15	£49
8K Ser	FR10; FR15; XB24-10; XB24-15	£64

BUFFERS

32K Ram Card for LC24-10 & 15	£55
32K Ram Card for XB24-10 & 15	£55

Ribbons

LC10; LC10-II; LC15 Black	£4
LC10 Colour Ribbon	£6
XB24-10 & XB24-15 Black	£5
XB24-10 & XB24-15 Colour	£12

LASER PRINTERS

12 MONTHS FREE MAINTENANCE ON SITE

Canon LBP-4		£849
Canon LBP-8 III		£1375
Canon LBP-8 IIIT		£1739
Canon LBP-8 IIIR		£1869
Epson GQ5000	6ppm	£860
HP Laserjet IIP	4ppm	£795
HP Laserjet IID	8ppm	£1899
HP Laserjet III	8ppm	£1249
Panasonic KX-P4420	8ppm	£949
Panasonic KX-P4450i	11ppm	£1225
Qume Crystal Print WP+		£775
Qume Crystal Print Ser. 2		£1099
Qume Crystal Print Postscript		£1999
Star LP-8 II		£1149
Star LP-8 II 2 Bin		£1595
Star LP-8 Star(post)script		£1695

Laser Toners

Canon 2	£60	Laserjet II	£79
Canon 4	£70	Laserjet IIP	£79
Epson GQ	£20	Panasonic	£29
Star	£–	Qume Crystal	£25

Laser RAM Upgrades

HP Laserjet II RAM		GQ5000	512k	£99
Jetware II 1MB	£199	KX-P4420	1M	£249
Jetware II 2MB	£349	KX-P4450i	1M	£299
Jetware IIP 1MB	£199	KX-P4450i	2M	£575
Jetware IIP 2MB	£479			

Handy Printer Switch

A handy two way compact printer switch that enables you to connect 2 Micros to 1 printer, or 2 printers to 1 Micro. Attaches easily to your printer, monitor, etc. A low cost solution for educational establishments. Ideal for those wishing to use a dot matrix and a laser printer. Available in two configurations.

Compact AB Switch Centronics	**£19**
Compact AB Switch RS232	**£18**

(Cables extra at £6 each)

MEGABUFFER 256

The Smallest 256K Printer Buffer Unit in the world **38mm x 130mm x 134mm.**

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. The features are:

- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatiblity with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in text unit for both the buffer & your printer.

Only £119 (carr £5)

Epson Printers

EX800	**£429**	LQ1050	**£540**
EX1000	**£564**	LQ1060	**£649**
FX850	**£315**	LQ2550+	**£849**
FX1050	**£385**	LX400	**£129**
FX1060	**£679**	LX850	**£179**
LQ400	**£198**	SQ850	**£515**
LQ850	**£439**	SQ2550	**£789**
LQ550	**£269**	TLQ4800	**£1449**
LQ860 Colour	**£535**		

CUT SHEET FEEDERS for

EX800/FX800/850/LQ800/850	**£130**
FX1000/LQ1000/1050	**£175**
LQ2550	**£390**
LX400/800/850/LQ400/500/550	**£69**

TRACTOR FEED for

LQ800 **£44**; LQ850/FX850 **£69**; LQ1050/FX1050 **£85**; LQ2500 **£90**; LQ2550 **£90.**

ACCESSORIES

● EX800/1000 Colour Option	**£45**
● EX800/1000 Colour Ribbon	**£14**
● LQ2500 Colour Option	**£65**
● Multifont Card for LQ550/850/1050	**£95**

Epson Printer Interfaces

All these interfaces fit inside the printer

RS232	**£32**	RS232 + 2K Buffer	**£52**
IEEE 488	**£40**	RS232 + 8K Buffer	**£79**

PRINTER LEADS

BBC Centronics 4' long	**£5**
BBC Centronics 6' extra long	**£7**
Compact's Special Centronics Lead	**£7**
Archimedes Printer Lead 6'	**£6**
Nimbus Centronics Lead	**£6**
IBM Parallel Lead 6'	**£6**
Double Ended 36 way Centronics Lead 4'	**£7**
Double Ended 36 way Centronics Lead 6'	**£9**
MSX Centronics Parallel Lead 4'	**£12**
RS232 Leads (Various)	**P.O.A.**

Universal Printer Sharers/Changer

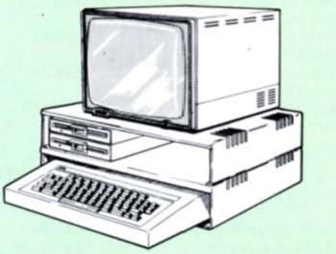
Connect upto 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spaghetti Junction of wires). Internal connection is made via high quality ribbon cables.

(Ideal for School environments)

Connects	Serial	Centronics	P&P
2 to 1	£20	£22	£3
3 to 1	£27	£30	£3
5 to 1	£36	–	£4

(Cables extra at £6 each. Please specify type required when ordering)

Plinths for BBC Micro, Master & Printer



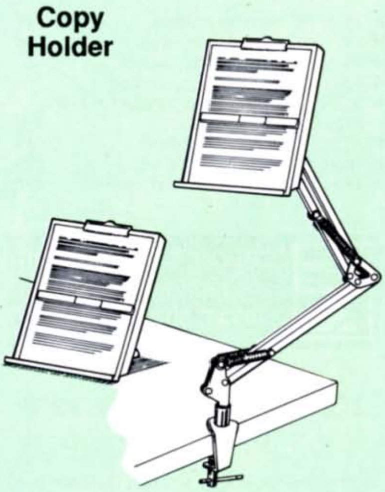
Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid.

The single printer stand is equally sturdy but instead of cooling slots it has elegant cutouts on the sides. This allows easy access to paper from all sides. Colour: BBC Beige.

Single BBC Plinth	420 x 310 x 105mm	**£13**
Double BBC Plinth	420 x 310 x 210mm	**£24**
Printer Plinth	420 x 310 x 105mm	**£12**
Single Master Plinth	490 x 310 x 105mm	**£14**
Double Master Plinth	490 x 310 x 210mm	**£26**

(Carr. Single plinth £2; double plinth £3)

Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding you paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top **£7** (carr. £3)
Angle poise **£12** (carr. £3)

Listing Paper (Perforated)

● 1,000 Sheets 9.5" x 11" Fanfold Paper	**£7**
● 2,000 Sheets 9.5" x 11" Fanfold Paper	**£11**
● 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold	**£21**
● 1,000 Sheets 15" x 11" Fanfold Paper	**£9**
● 1,000 Sheets true A4 Fanfold Paper 70gms	**£11**
● 2,000 Sheets true A4 Fanfold Paper 70gms	**£21**
● Teleprinter Roll (Econo paper)	**£4**

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50, 2K Sheets £3.00

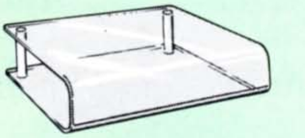
PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	**£5.00**
1,000 90 x 36mm (Twin Row)	**£4.90**
1,000 90 x 49mm (Twin Row)	**£7.50**
1,000 102 x 36mm (Twin Row)	**£6.25**

Carriage on 1,000 Labels £1.00

Perspex Printer Stand



Give you Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version	**£16** (carr £3)
136 Column version	**£20** (carr £4)

Professional Printer Stand

The professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Its ergonomic design ensures smooth paper flow and automatic refolding.

80 Column version £28 (carr. £3)
132 Column version £30 (carr. £4)

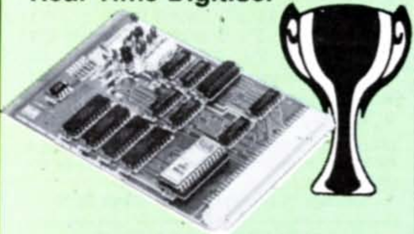
Printer Ribbons & Various Dust Covers

Type	**Ribbons**	**Dust Covers**
Brother HR15/20	**£3.50**	**–**
BBC Micro	**–**	**£3.50**
BBC Master	**–**	**£4.00**
Archimedes Micro pair	**–**	**£9.00**
Citizen 120D	**£3.95**	**£4.50**
DMP2000	**£3.75**	**£4.75**
EX/LQ800	**£4.50**	**£4.50**
EX/LQ1000	**£6.75**	**£5.00**
RX/FX80/85/800/MX80	**£3.25**	**–**
FX/MX/RX100/1000	**£5.00**	**–**
Kaga/Taxan KP810/815	**£4.90**	**£5.00**
LQ500/550/800/850	**£4.50**	**£6.00**
LQ1050/LQ2500	**£7.00**	**–**
LX80/86/800/850	**£3.25**	**£4.50**
M1009/GLP	**£3.80**	**£3.75**
NEC P2200	**£6.00**	**£5.00**
Panasonic KX1080/81	**£3.50**	**£4.75**
Panasonic KX-1124	**£8.00**	**£5.00**
SQ2500	**£23.00**	**£5.50**
Star LC10/NL10	**£4.25**	**£5.00**
Star LC24-10	**£5.00**	**£6.00**
Olivetti Ink Jet Cartridges (set of 4)	**£9**	

Our attractive Dust Covers are manufactured from translucent PCV. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Continued→ → → → → → → → →

Archimedes Real-Time Digitiser



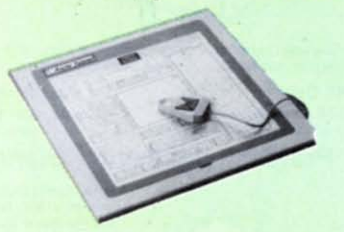
Now supplied with NEW RISC OS Version Software

Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £215

A Set of Colour Filters for colour image grabbing using a video camera	£16
New Risc-OS Software Upgrade	£39

Archi Graphic Tablet



The Archi Graphic Tablet offers performance and accuracy comparable to other tablets priced at well over £400, and has the useful addition of a liftable cover, which can hold tracing material or menu templates securely. The package is supplied complete with sophisticated Archi software. (Now, fully LinCAD compatible. Recommended by Linear Graphic).
(FREE this month, PC Mouse Drivers & Art package)
(For further details, please write in or telephone for our descriptive leaflet).

Special Price £249
(Price includes Tablet, Leads, Software & Puck)
Stylus Optional Extra **£29**

DISC PLONKER RACK

When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the harzards of fingerprints, scratches, dust, coffee and an untidy desk. Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

Protection at Only: **£2**

Acorn & Watford DFSs

● Watford sophisticated DFS ROM	£16.00
● Watford DFS Kit complete	£69.00
● We will exchange your existing ROM for Watford's ultimate DFS ROM at only	£12.00
● DFS Manual (comprehensive)	£6.95
● Acorn DNFS ROM	£17.00
● Acorn ADFS ROM only	£25.00
● Acorn 1772 DFS ROM Kit	£49.00

(The single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with the their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

Watford's MkII 1772

Single/Double Density DFS

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!
If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£39.00.**

● SPECIAL PRICE	£44.00
● DDFS Manual	(No VAT) £6.95
● We will exchange your existing DFS Kit for our sophisticated DDFS for only	£30.00

Please note, as the MkII DDFS is a hardware and sofware upgrade, it is not possible for existing Watford DDFS users to simply exchange the ROM for the new version.

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electonics your 3M Appointed Distributor

● *10 x 5.25" S/S D/D 40T (744)*	*£5*
● *10 x 5.25" D/S D/D 40T (745)*	*£7*
● *10 x 5.25" S/S D/D 80 Track (746)*	*£8*
● *10 x 5.25" D/S D/D 80 Track (747)*	*£9*
● *10 x 5.25" 1.6M D/S D/D High Density for IBM XT and AT*	*£13*
● *10 x 3.25" S/S D/D 40/80 Track*	*£9*
● *10 x 3.25" D/S D/D 40/80 Track*	*£8*
● *10 x 3.5" Double Sided High Density*	*£18*

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

TOP QUALITY 3.5" & 5.25" DISKETTES

To complement our range of Quality Discs and Disc Drives. WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

● *10 x **M3** 3.5" D/S D/D 80 Track*	*£8*
● *10 x **M9** 3.5" D/S High Density*	*£17*
● *10 x **M4** 5.25" S/S D/D 40 Track*	*£5*
● *10 x **M5** 5.25" D/S D/D 40 Track*	*£7*
● *10 x **M7** 5.25" D/S D/D 80 Track*	*£8*
● *10 x **M8** 5.25" D/S H/D Hi-Density*	*£13*
● ***M2** 3" Double Sided*	*£3 each*

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. it is very simple to use. Available in 3.5" & 5.25", please specify.

Price £4

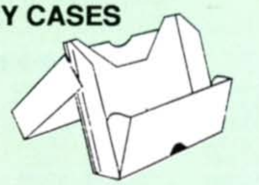
ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection – Strong plastic case that affords real protection to your discs.
Antistatic helps avoid data corruption whilst in storage. The smoked top locks down.
Dividers and adhesive title strips are supplied for efficient filing of discs.

● **M35** – holds up to 50 5.25" discs	£4.95
● **M85** – holds up to 95 5.25" discs	£6.95
● **M25*** – holds up to 25 3.5" discs	£4.95
● **M50** – holds 50 3.5" discs	£6.50
● **M10** – holds 8 of No. 10 Data Cartridges	£15

* Not lockable

PLASTIC LIBRARY CASES



Holds up to 10 5.25" Discs. **Only £2.00**

DUST COVERS (For our Disc Drives)

Single CLS (without PSU)	£3.20
Single CS (with PSU)	£3.25
Twin CLD (without PSU)	£3.85
Twin CD (with PSU)	£3.90

DISC ALBUMS

Attractively finished in black leather-look vinyl. Stores up to 20 discs. Each disc can be seen through the clear view pocket.

£4

Special BULK OFFER on 5.25" DISCS

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

PRICES SLASHED

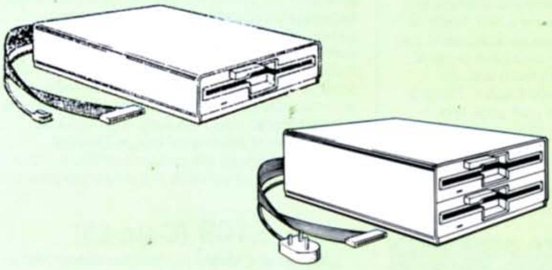
BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves	£30	£35	£40
● With Sleeves	£33	£38	£43

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.
The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.
All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. *Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*
Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high qulity NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.
If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. ***Ideal for Schools & Colleges.*** *We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £18. (At Watford we anticipate your needs of tomorrow, not just today!)*
When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with a Watford plinth. (Turn to the 4th page of our advert for the Plinths).
P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.

Our Disc Drives conform to BS415



"Test Bureau Approved for Use in Education"

Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
400K (720K)	CLS400S £74		CS 400S £83	
800K (1,44M		CLD 800S £149		CD 800S £162

● TWIN Disc Drive Case, complete with Power Supply & Cables **£43**
Securicor carriage on Disc Drives £6 to £7

Prefix ***C** = Cased Drive*
***L** = Less PSU*
***S** = Single*
***D** = Double*

Suffix ***S** = 40-80 Switchable*

e.g. *CLS400S = Cased Disc Drive, Less power supply unit, single 5.25" 400K, (720K in double density); Double sided; 40/80 track switchable.*

Refurbished Disc Drives now available
CLS400S £50; CLD800S £98; CS400S £59; CD800S £115

Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13

Special 40/80 Disc Drive/DDFS Mk II Offer

- The popular 40/80 track 400K single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's extremely popular DDFS Disc Interface (allows 720K storage). Will run in both Single & Double Density modes.
- A comprehensive User Friendly Manual.

A Bargain at Only **£119** (£7 carr) (Offer valid while stocks last)

3.5" DISC DRIVE OFFER

These top quality 3.5" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

Drives to connect to BBC Micros own PSU

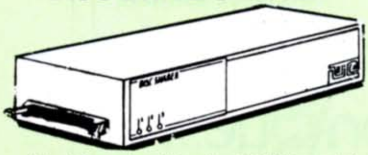
- **CLS35 400K Unit £65**
- **CLD35 Twin 800K £119**

Drives with built-in Power Supply Unit

- **CS35 Single 400K £85**
- **CD35 Twin 800K £129**

(P.S. CS35 Single is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage).

DISC DRIVE SHARER

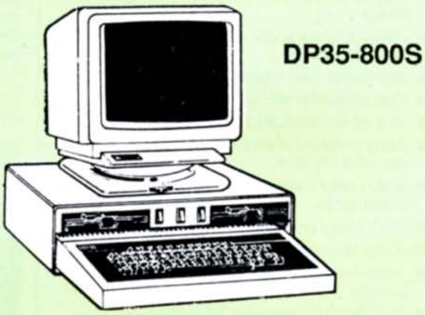


(Ideal for educational establishments)

At last, a low cost alternative to the Econet system.Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Offer Price : **£55** Price includes 3 Cables

CDPM 800S



DP35-800S

Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

CDPM 800S for the BBC B & Master £175

A Double disc drive with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master series is the 5.25" disk, the standard of the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.

To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S. It contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.

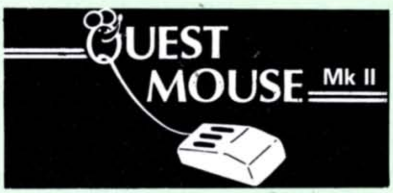
The 5.25" disc drive is 40/80 track switchable. DP35-800S has its own power supply, independent of the BBC Micro.

DP35-800S for BBC/Master £165

(Securicor Carr. £7)

(The above drive units are 2 Megabytes unformatted)

Continued→ → → → → → → → →



QUEST MOUSE Mk II

Quest Mouse II & Quest Paint	£58
Quest Mouse II, Quest Paint, AMX Stop Press & Pagefont	£89
Quest Mouse II only	£29
Quest Paint Software only	£34
Quest Font Disc (22 Text Fonts)	£15
Quest Mouse Mat (Red or Blue or Green please specify)	£3
Part Exchange your unreliable AMX Mouse for a Quest Mouse for only	£22

(P.S. Quest Paint is not compatible with BBC Compact)

Winner of the BBC Acorn User 1990 Award for the Best Art/ Graphics software

ConQuest

Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

Some of the features are:

- *Pick filenames off the screen for loading and saving.*
- *Rotate a cutout to any angle and Distort it to any four sided shape.*
- *Has Built in Font editor.*
- *Default brushes and patterns on startup.*
- *16 x 16 font available on start up.*
- *Ability to reset patterns, fonts and brushes to default at any time.*
- *ROM based enhanced Epson and compatible printer dump.*
- *ROM based enhanced extended picture routine.*
- *Ability to create and abort extended pictures.*
- *Improved disk access speed for extended pictures.*
- *User definable sideways RAM driver for incompatible sideways RAM systems.*
- *Ellipses at any angle on Master 128 (or B with GXR ROM).*

ConQuest ROM Package £30

(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)

NEW

ARCHI Mk II MOUSE

An extremely reliable replacement mouse for Archimedes Micro £39

RB2 Marconi TRACKER BALL

RB2 (AMX/Quest compatible)	£45
RB2 including Quest Paint	£75
RB2-A for Archimedes	£46

THE NEW Mk III AMX MOUSE

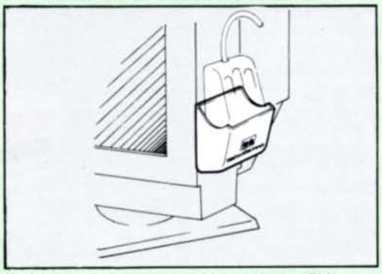
Inc. Super Art package.

ONLY: £59 (carr £3)

(Please specify for BBC, Master or Compact)

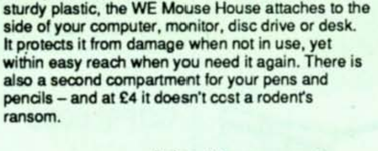
MOUSE MAT	£3
AMX MOUSE ONLY	£29
AMX SUPERART Package	£34
AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse	£32
PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£13
AMX DESIGN (ROM)	£55
AMX XAM Educational	£15
AMX EXTRA EXTRA	£16
AMX MAX A gem of desktop (ROM)	£20

WE MOUSE HOUSE



Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive or desk. It protects it from damage when not in use, yet within easy reach when you need it again. There is also a second compartment for your pens and pencils – and at £4 it doesn't cost a rodent's ransom.

Price £4



Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted. (Price includes FREE software Disc and Operating Manual)

Only £21

FLEET STREET EDITOR

Software pack for BBC Micro	£33
Software pack for the Master	£39
Admin Xtra Disc Utility	£13
Fonts N Graphics Disc Utility	£13

BEEB
VIDEO DIGITISER

"Test Bureau Approved for Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem. The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional ★ commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROMs to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image. Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£109 (Carr. £5)

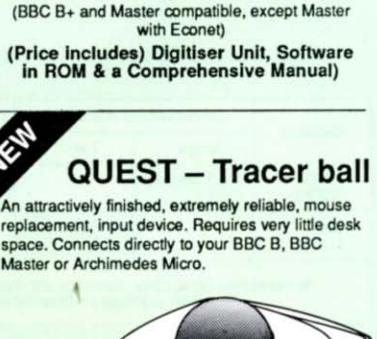
(BBC B+ and Master compatible, except Master with Econet)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)

NEW

QUEST – Tracer ball

An attractively finished, extremely reliable, mouse replacement, input device. Requires very little desk space. Connects directly to your BBC B, BBC Master or Archimedes Micro.



QT-10 BBC/Master Version	£32
QT-20 Archimedes Version	£35

WAPPING EDITOR
"MIGHTIER THAN THE QUILL"

Winner of the BBC Acorn User 1990 Award for the Best DTP/ Word Processor

The WAPPING EDITOR

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'Turbo DFS' which gives DFS access times comparable with those of ADFS.

PAGE LAYOUT SECTION

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module is a mode 0 version of the highly acclaimed Quest Paint package, and incorporates all the same drawing facilities, e.g. pencil, brush, airbrush, polygon, circle, ellipse, fill, cut-and-paste, etc., etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be – it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

WORD-PROCESSOR

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

cont./-

THE FONT EDITOR

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designed to take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individually proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.

Upgrading to the Wapping Editor could not be easier since the font editor will convert fonts from other packages, such as Quest Paint or Stop Press (formerly Pagemaker), into Wapping Editor format and a mode conversion utility will convert any screen in modes 1, 2, 4 or 5 into a full grey-scale mode 0 screen. Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser, either independantly or from within the Wapping Editor package.

Wapping Editor Software Pack	**£69**
Wapping Editor plus Mouse	**£89**

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc. Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.

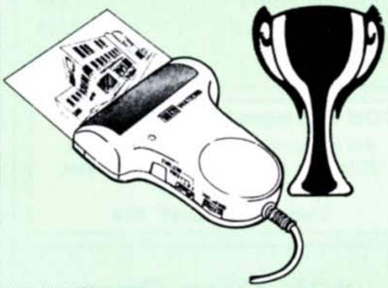
Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.

There are two prepared hi-res pages layed out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.

A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routine you can archive large numbers of screens onto a single disc.

£15

The Beeb HandScan
Hand-held Scanner for the BBC Micro



Watford Electronics are pleased to announce the launch of the first hand held scanner for the BBC Micro. HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs! These useful devices have been available for faster and more expensive micros for some time, but only now is Watford Electronics able to offer the BBC Micro computer.

The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilities provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various types of dithering may be selected to simulate the grey levels of a scanned picture.

All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

Beeb HandScan & Firmware	£135

Wapping Font Disc

Sixteen Wapping Editor fonts including smaller versions of Oberon and Daisy and two new sizes of the standard font.
Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.
Supplied complete with instructions.

£12

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

NEW

Laser Direct
For Archimedes Micro

By using the power of the Archimedes RISC processor, it offers the best of both worlds – print speed up to 5 times faster than typical Laserjet compatibles – uses outline fonts so that any font can be scaled to any size – works with all programs that use RISC OS printer drivers. Ideal for use with Genesis, !Draw, Acorn DTP, Impression, etc. Includes 50 sheet paper tray and a single sheet/envelope tray. Requires one expansion slot and at least a 2Mbyte Archimedes. A very compact printer, a very low initial cost and very low running costs.

Launch Offer: £949

(For demonstration, call in at our retail shop)

NEW

Beeb PC (BASIC)

Beeb PC Basic is designed for program authors wishing to convert programs so that they will run on IBM personal computers. To convert BBC BASIC programs manually can waste days of valuable time with every occurrence of common statements such as PROC, DEFPROC, TAB, having to be changed. Beeb PC (BASIC) automates many of these changes, and will convert majority of BBC statements that are invalid for IBM BASIC into equivalent acceptable statements. In addition BBC BASIC data files can be converted to IBM BASIC format, with support provided for all BBC data formats:- INTEGER, REAL & STRING.

Price: £38

Beeb DOS 2.2

The BBC and IBM PC's are the most popular micros in the UK. The BBC is firmly established in the education sector and the IBM is the industry standard in the business world. The pools of information and applications held on these computers are immense, yet the means of passing information between them are very limited. Beeb DOS provides a practical method of transferring information between these two micros.

Beeb DOS is a collection of utilities which run on the PC's and enable it to read and write information on BBC discs. You can transfer files between your PC's 360K floppy, high density floppy or hard disc and your BBC discs. In addition Beeb DOS allows you to catalogue, format and compact BBC discs and delete, re-name, lock and unlock BBC files, all on PC's. Each Beeb DOS utility is written in IBM assembler and is run directly from PC or MS-DOS. The Beeb DOS utility can be run from floppy disc, hard disc or RAM drive.

Beeb DOS is supplied on an IBM 5.25", 360K disc complete with a comprehensive operating manual.
(Will only work on 360K Disk Drives)

Price: £39

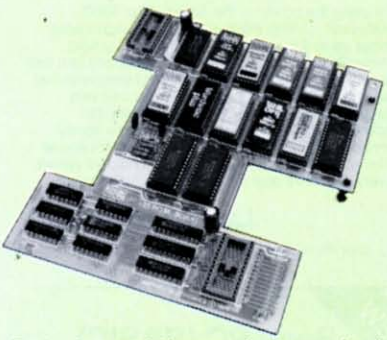
(Please write in for technical literature)

Continued→ → → → → → → → →

STAFF VACANCIES

Watford Electronics is the leading supplier in the Acorn computer field and has established itself in the PC compatible market with its Aries PC computers. In its eighteen year history, Watford has always kept itself at the forefront of the new technology. Due to our latest expansion, we require staff to man our BBC/Archimedes and PC Technical Departments. Applicants will be required to be familiar with BBC/ Archimedes hardware and software, and PC staff will need to be familiar with PC computer hardware. Good rates of pay, excellent prospects. Subsidised company accomodation is available to single persons if required. Telephone Keith Archer or Richard Overfield for interview, or write to us enclosing your CV.

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:

- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £35
Battery Backup fitted **£39**
Battery Backup only **£3**
16K Sideways RAM **£8.50**
(carriage £3)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

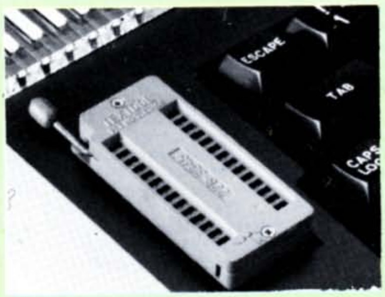
USER PORT SPLITTER UNIT

User Port Splitter
A
B

Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaneously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination

Excellent Value at **£22** (carr £2)

Sideways ROM ZIF Socket System



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£18** (carr £3)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

● Complete System	**£11**
● Spare Cartridges	**£2.75**
● Spare Rack	**£1.65**

ROM Cartridges for the BBC Master

Will accept the new larger Piggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc

Twin **£9;** Quad **£14**

16K Disc Ram Module

(16K Sideways RAM Module)

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances)
- Compact construction
- No overheating or overloading problems.
- Free utilities disc supplied
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional Battery back-up fitted **£3**

ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Cobal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved ★FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as th printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on you BBC micro – no flying leads to connect and no soldering. Provision of the onboard ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£59** (carr. £3)

Aries B-12 Sideways ROM Board

The B-12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost

Price:	Aries B-12	**£36**
	Aries B-12C	**£5**

ARIES B-488 IEEE-488 INTERFACE UNIT

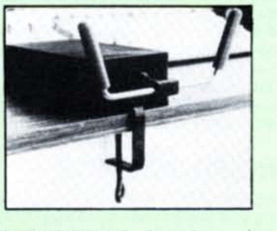
The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB or 'HP IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

VOLTMACE JOYSTICKS

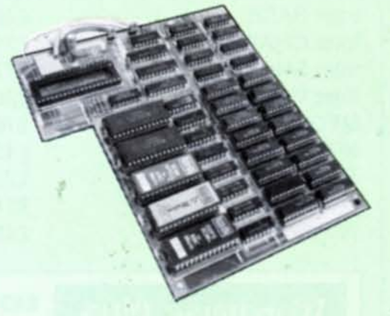
Delta 3B Single Joystick	**£10**
Delta 3B Twin Joysticks	**£15**
Delta 3C Joystick for Compact	**£10**
Delta 14B Single Joystick	**£11**
Delta 14B/1 Adaptor Module	**£12**
Transfer Software Disc-Tape	**£7**
Delta-Cat A mouse eliminator Joystick for the Archimedes	**£24**

Delta Base B



Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128	**£25**

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 7 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Compatible with BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROMSPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

INTRODUCTORY PRICES:

● ROM/RAM card with 32k dynamic RAM	£48
● ROM/RAM card with 64k dynamic RAM	£65
● ROM/RAM card with a massive 128k dynamic RAM	£109

(carriage on ROM-RAM Card £3)

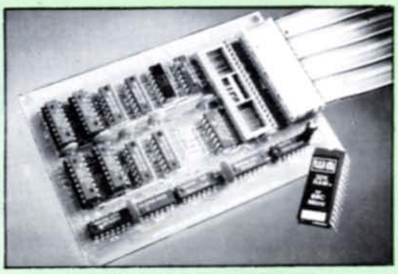
OPTIONAL EXTRAS:

● 16k plug-in Static RAM kit	£9
● 16k Dynamic RAM for Upgrade	£13
● Battery backup	£3
● Read and Write protect switches	£2 each
Complete ROM-RAM board All options installed	£115

P.S.

IS your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford, ROM/RAM Board and pay £5 less.

32K
SHADOW RAM-Printer Buffer Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16k or even 20k, but a massive 32k of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.

- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20k of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28k of program space.

- Use the FULL 32k or the bottom 12k of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS432 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138, 145,ADVAL etc). Please note only a 12k printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only £59 (carr £3)

(Price includes a comprehensive manual and the ROM)

Acorn Speech Synthesizer package complete, for the BBC B Microcomputer

Special Offer £18

Watford Electronics are:

- Acorn Qualified Dealer & Econet Referral Centre
- ARIES PC Dealer/Distributor
- Cambridge Computer Dealer
- Epson Silver Centre
- EIZO Monitor Dealer
- Microvitec Appointed Dealer
- NEC Appointed Dealer
- Panasonic Premier Dealer
- Roland Plotter Official Dealer
- Star Printer Sub Distributor
- Taxan Appointed Monitor Dealer
- 3M Media Premier Distributor

BBC SOFTWARE'S Popular Educational Software

● Maths with a Story 1 (Disc). 4 primary level maths programs	£11.25
● Maths with a Story 2 (Disc). 4 further maths programs.	£11.25
● Picture Craft (Disc) 6-14 age group. Pack consists of flexible geometrical design & colouring programs.	£17.00
● BONDING: Science (Disc) O-Level Chemistry program.	£20.00
● ELECTROMAGNETIC SPECTRUM (8 Discs) O-Level program.	£20.00
● ELECTRONICS IN ACTION (Disc) O-Level program.	£19.95
● NEWTON & THE SPACE SHUTTLE (Disc) O-Level program.	£20.00
● ECOLOGY (Disc) O-Level program.	£20.00
● POLYMERS (Disc) O-Level program.	£20.00
● Classification & Periodic Table O-Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule.	£20.00
● FOOD & POPULATION (Disc) O-Level program.	£20.00
● MICROTECHNOLOGY (Cassette) O-Level program.	£11.25
● DEUTSCH DIREKT! (Disc & Audio Cassette)	£19.95
● Modem Master (Disc)	£11.25
● ADVANCED TELETEXT SYSTEM	£8.65
● PERIOD TABLE SOFTWARE	£20.00
● Astronomy – Primary (Disc)	£12.00
● Computers at Work – Primary	£17.35
● Introducing Geography 11-17 years	£17.50
● Electric Fields 6-14 years	£11.25
● Black Queen Contract Bridge	£13.00
● Espana Viva – 3 Discs	£19.95
● WHITE KNIGHT Chess game	£16.00

Educational Software

FUN SCHOOL 2 – Red:

Under 6 yrs – 8 programs on Discs, Shape Snap, Find the Mole, Teddy Count, Write a letter, Colour Train, Pick a Letter, Spell a Word & Teddy Bears Picnic. £12.00

FUN SCHOOL 2 – Green:

6-8 yrs – Eight programs on Disc, Number Train, Shopping, Maths Maze, Treasure Hunt, Bounce, Packing Caterpillar, 3 Number jump £12.25

FUN SCHOOL 2 – Blue:

Over 8 yrs – Eight programs on Disc, Build a Bridge, Passage of Guardians, Unicorn, Logic Doors, Souvenirs, Code Boxes, Mystery Machine & Escape. £12.50

● PUNCMAN Learning punctuation	
Puncman 1 & 2 for 7 – 13 years	£15
Puncman 3 & 4 for 8 – 14 years	£15
Puncman 5 & 6 for 8 – 15 years	£15
● Yes Chancellor – A chance to take over number 11 at Downing Street. 12 years+	£18
● Letters & Pictures – Introduces phonic skills to Infants 6-8 years	£15
● Numbers & Pictures – Early number learning is a great fun (4-6 years)	£15
● Note Invaders – Budding musicians can learn the notes on the Clef with this elegant game 3 programs (7 to Adults)	£15
● Maps & landscapes No. 1 (9-14 years)	£18
● Help Your Child learn Basic Map work No. 2 (9-14 years)	£18
● Pirate – Educational Adventure (8-14 years)	£15
● Spelling Week by Week (6-14 years)	£18

Archimedes Software

● BUMPER DISC	£14
● Bumper Disc 2	£14
● Fun School 2A Red (up to 6 years)	£14
● Fun School 2A Green (6-8 years)	£14
● Fun School 2A Blue	£14

Continued→ → → → → → → → →

VIEW 3.0 ROM	**£45**
VIEW PROFESSIONAL	**£50**
VIEWSHEET (Acornsoft)	£36
VIEWSTORE	£36
VIEWSPELL with 80 track disc	£25
VIEWPLOT Disc (Please specify for Master 128 or Compact)	£20
VIEW-INDEX	£12
OVERVIEW packs 1 & 2	£65
HI-VIEW	£38

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc)	£8
Juki & Brother HR15 (Disc)	£8

OFFICE MASTER

CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trial balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

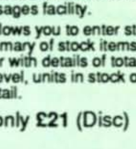
EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE



- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

DATABASE – Set up a computerised card index system with powerful search facilities.

SPREADSHEET – Offers many calculation and editing features

BEEBPLOT – Provides visual representation from Spreadsheet data.

OFFICE MATE Only £10 (Disc)

MINI OFFICE II

DISC Version for BBC B & B+	**£14.00**
DISC Version for BBC Master	**£16.00**
DISC Version for the Compact	**£18.00**

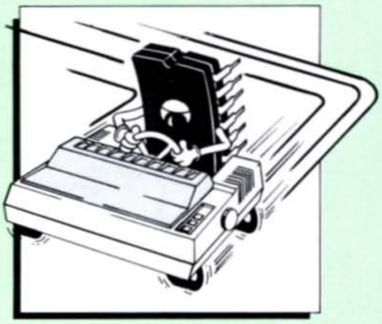
(When ordering please specify for which Micro & 40 or 80 track Disc)

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

Advanced Computer Products

Advanced Disc Toolkit	£28
Advanced Disc Investigator	£24

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing at only a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built-in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redifinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute ★ command when printing.

Other features include a very powerful on-screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory-based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips.

Price: Only £33

COMPUTER CONCEPT'S ROMS

COMMUNICATOR	**£49**
DISC DOCTOR	**£28**
Inter BASE	**£49**
Inter CHART	**£25**
Inter SHEET	**£37**
Inter WORD	**£36**
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Wordwise plus **£40**

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

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- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc interface in your Micro)

BOOK

The Complete Mouse User Guide to BBC Micro

This manual has been written to reveal the secrets of the mouse. It explains all the principles required by the hardware and associated software, and also example listings for inclusion into custom programs. The manual first details the basic principles of the mouse and a simple program which uses these principles. This information should be adequate for most applications. However, it is possible to improve the performance of the mouse by expanding on the principles already used in the software. This is again fully explained and an example program given.

It is possible to gain a full understanding of the mouse from this manual. For those not interested in exactly how the mouse functions, complete example programs are also included. These may be typed directly into the micro, without the need for any understanding of the hardware or software involved, enabling the mouse to be used for custom applications.

Price £5.95 (No VAT)

Example programs on Disc £4.95

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THE COMPLETE BBC COMPUTER USER HANDBOOK

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If you own a BBC-B, BBC B+, Electron, Master 128, Master Compact or Archimedes then this book is for you. It shows you how to get the most from your computer, and how to make the computer work for you. Although some sections are machine specific, most of the information, programs, hints and good solid experience are for the whole range of BBC machines. The general style and level means that both beginner and expert will feel satisfied with the quality and quantity of the material.

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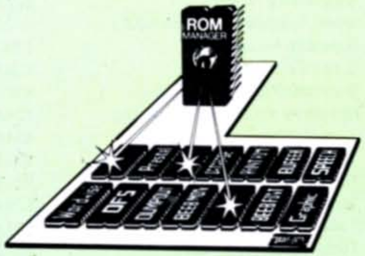
ROM MANAGER



Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs . Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.
"Provides comprehensive management of all your installed ROMs". (BEEBUG November '84.)

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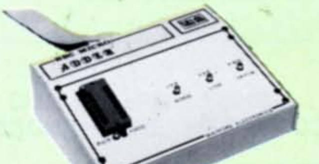
ADDER



The only low cost EPROM Programmer for the BBC Micro that will program both the standard 21V and the new 12V5, 27128 EPROMS.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.

Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs: 2516, 2716, 2532, 2732, 2764, 27128, & 27256.

£65 (£5 Carr)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs!
The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£32**(carr £3)
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- Spare UV tubes. **£12**

Servisol Foam Cleaner

This 415Ml, king size multi-purpose foam cleaner spray is ideal for cleaning the Keyboard, Monitor, Disc Drive and your computer furniture surfaces. Simply spray on the surface to clean and wipe off with a clean cloth.

£2.50

Antistatic Aerosol Spray

Ideal for cleaning and preventing static build-up on TV/ Monitor Screens.

£2.50

Aerosol Dust Spray

This simple to use aerosol spray is ideal for removing Dust and Dirt deposits from the Keyboards and similar inaccessible places. **£3**

SPARES for BBC Micro

BBC Keyboard	**£46**	Speaker	**£3**
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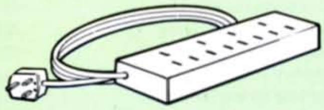
Replacement Flexible 17 way Keyboard Connector			**£4**

Surge Protector Plug

Fitted in place of your normal mains plug, this device protects your equipment (and data from corruption), against mains high voltage transient spikes/surges caused by lightening or thermostats switching.

Protection for only **£8.50**

4 Way Mains Distribution Socket



4 way top quality mains trailing sockets.
Supplied wired up with mains plug ready for use.
Can be screwed to floor or wall if required.
Very useful for tidying up all the mains leads from your peripherals.

£9.50 (carr £1.50)

Aries Spike Cleaner Unit

A 4 way mains distribution unit as above with a built-in Surge Arrester, providing protection for your complete Computer/Hi-Fi System

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ROM Extraction Tool

This extremely useful tool allows you trouble free chip insertion and removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip. **£2**
Metal Chip Extractor **£3**

28pin DIL HEADER PLUG

SOLDER type **£1.50** IDC CRIMP type **£1.95**

8 WAY DIP SWITCH

Increase the speed of your Disc Drives by soldering this switch to your BBC B or B+ keyboard

Only **£1.00**

28 pin ZIF SOCKET (Textool) **£6.95**

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(All ready made and tested)

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to 3 pin DIN Plug + 1 Jack Plug	£2.50
to 7 pin DIN Plug	£3.00
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Supply from BBC power supply to standard Disc Drive Connection: Single **£3.00**; Dual **£3.75**

DISC DRIVE INTERFACE LEADS
BBC to Disc Drives Ribbon Cable
Single **£4** Twin **£6**

Miscellaneous Connectors

	Plugs	Sockets
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Convert two single Disc Drives into one Dual Drive with this simple external unit (Suitable for Disc Drives with PSU. For Disc Drives without PSU, you will also require Watford Power Duck, see below).

£14

Watford POWER DUCK **£8**

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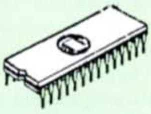
ASSORTED ROMS



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ARIES P20-HD PC Portable

Full Desktop PC Power For People On The Move

Imagine an IBM PC compatible laptop that can fit inside your briefcase (with room left over), so light (just over 7 pounds) that it is easy to carry wherever you go, and a choice between AC and rechargeable battery power, so you could use it any-where. The Aries portable has made your dream a reality with the world's most powerful compact Laptop. Also it is the FIRST COMPACT PC PORTABLE, incorporating a HARD DISK at under a £1,000.

The Aries portable has an energy-efficient 80C88 micro-processor that runs at 10MHz, a built-in high-capacity high speed, 20MB Hard disk drive, 1MB RAM, an advance LCD display, and a standard full-size keyboard with comfortable tactile feedback. The Aries Portable also has a full complement of six built-in ports (two RS232, one printer, one external FDD, one RGB monitor, one mouse), so you can add on extras wherever you settle down. All of this in a case so compact that it can easily fit inside your briefcase.

In his independent review (Computer Shopper, May 1990), the reviewer writes, – "Overall, the single most outstanding feature has to be the price tag. A notebook PC, with a hard disc selling for below £1,000 has no competition at the moment. If you have a small briefcase, weak arms or just like the concept of a truly portable computer then this is your man".

Just read the specification . . .

- **Processor:** 80C86 running at 10MHz Real time clock/calendar
- **Memory:** 1MB RAM (640K,384KbLIM/EMS)
- **Drive:** Built-in 2.5" 20MB Hard Disk Access Speed 28ms (optional external 3.5" 1.44MB)
- **Display:** EL backlit transflective supertwist LCD display, 80 characters x 25 lines, 640 x 200 bit-mapped graphics IBM CGA compatible
- **Stnd Interface** Parallel Printer Port. Two RS232C Serial Ports External disk drive port. CGA Colour monitor port External keyboard port or PS/2 mouse port
- **Stnd.Accessories:** AC mains adaptor/batt. charger. External FDD Convertor Battery pack
- **Dimensions:** 12"W x 2.4"H x 8.7"D
- **Weight:** Just over 7lb (incl. H'Disk/Batt.)
- **Power:** Internal removable Ni-cad batt. AC adaptor, 12V DC. Low battery indicator. Battery charge indicator
- **Bundled Software:** MS-DOS 3.3/GW-Basic Watford Drive package (allows data to be transferred with other PC Compatibles via parallel port. PC Organiser Diary, Calendar, WP

Introductory Offer

● 20 Hard Disc Version	£999
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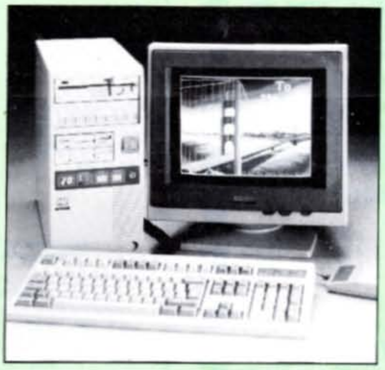
ARIES PC 386-SX



The Aries PC 386-SX combines many of the powerful features of the 386 system with the frugality of a price tag more at home on a 286 system. With 8/16MHz CPU, this system provides virtually full 386 performance, including the more convenient scheme of memory control that allows easy configuration of expansion RAM as EMS for DOS application.

Features:

- 80386-SX CPU with optional 80287/80387 Maths Co-Processor
- 8/16 MHz selectable speed
- Legal Bios with built-in Setup routine
- For OS/2 and XENIX
- On-Board EMS

Specifications:

- 1MB RAM on-Board expandable to 16Meg
- 1 x 5.25" – 1.2Meg Drive fitted
- 1 x 3.5" – 1.44Meg Drive fitted
- 40Meg 28mS Hard Disc Drive fitted
- HDD/FDD Controller Card
- 102 Key Keyboard
- Case with Keylock
- Eight expansion slots
- Two Serial and Parallel Ports
- Logitech mouse
- MS-DOS 3.3 & GW BASIC
- 12 months On-Site maintenance
- FREE £300 worth of Software/Hardware

Special prices:

● System 1 – As above plus a 14" High Resolution Flat Screen monitor	£1299
● System 2 – As above plus a 14" High Resolution EGA Monitor/Card	£1599
● System 3 – As above plus a 14" High Resolution VGA Monitor/Card	£1699

Brother Fax-150 Personal Fax/Telephone

Watford's Brother Fax-150 puts the power and convenience of fax within the reach of everyone who needs to send correspondence quickly and reliably.

More small businesses are turning to FAX to speed and improve communications, and businesses who have been using FAX are now buying backup and "executive" systems for contingencies, and those more delicate items that need to be kept confidential.

The Brother Fax-150 is the answer to all these requirements, featuring a full function telephone/fax with optional password security.

● BABT Approved ● Group 3 compatible ● Photocopier facility ● Built-in Slimline telephone ● Password Security feature ● Pulse or tone dialling ● Redial/on-hook dialling ● Speaker and handset volume control ● 20 push button memory numbers ● Time and date generation ● Switchable auto/manual ● Contrast adjustment ledgers ● 16 shades greyscale ● Sender and receiver ID etc.

Sale Offer Only £429

Spare Fax Paper Roll	£4

(Please write in for technical specification)

APPROVED for use with telecommunication systems run by British Telecommunications in accordance with the conditions in the instructions for use.

Watford Fax-Line Fax Splitter

The Watford Fax-Line fax Splitter doubles the utility of any phone line by automatically detecting and routing incoming fax to the fax machine, otherwise it routes the call to the telephone after a very brief message. Calls can even be directed to an answering machine. Standard BT connections provide simple plug-in-and-go operation. Fax-Line saves you hundreds of pounds in BT rental. **BABT approved.**

Launch Price: **Only £69**

(For a live 24 hour demo of Watford Fax-Line, please phone 0923 22 22 21)

Watford Electronics

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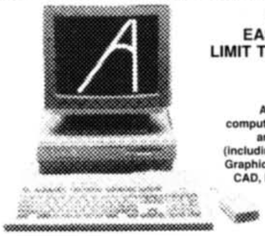

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ROUTINE MATTERS

Stephen Wade begins a new regular feature designed to bring together skills of experienced programmers

This month featuring routines to...

- Print out decimal numbers from machine code.
- Fade out Archimedes and A3000 screens with ease.

WELCOME to the very first routine matters column. Every month in these few pages, we'll be providing you with short applications, utilities, games and graphics programs – in fact almost anything you can think of.

Programs can be written in any language – Basic, 6502 code, ARM code, Wordwise Plus, Pascal and so on. Any routines are welcome, so whatever yours does, if you feel that it would be suitable for publication send it to the address below.

All routines should be accompanied by full documentation stating clearly what they do and how they work, and if possible supplied on disc – any format – or cassette. Make sure you enclose a stamped addressed envelope, otherwise the return of your media cannot be guaranteed.

Try to include more than one copy of your routine, and documentation should also be saved where possible to help us to process your submission much more quickly. Programs should make use of legal techniques and good programming practice – so they are more likely to work on the full range of machines, which increases the chance we'll use it.

The above comment applies to the use of the EQUate and OSCLI commands on the BBC Micro, which are unavailable on those machines still with Basic I installed inside them.

In these cases, the direct command should be replaced with the appropriate routine from those listed in the table.

Command	Replace with	Add to end of program
EQUB x	OPT FNequb(x)	DEF FNequb(S%) ?P%=S%:P%=P%+1 =pass
EQUW &x	OPT FNequw(&x)	DEF FNequw(S%) !P%=S%:P%=P%+2 =pass
EQUD &x	OPT FNequd(&x)	DEF FNequd(S%) !P%=S%:P%=P%+4 =pass
EQUS "x"	OPT FNequs("x")	DEF FNequs(S$) $P%=S$:P%=P%+LEN(S$) =pass
OSCLI "x"	PROCoscli("x")	DEF PROCoscli($700) LOCAL X%,Y%:Y%=7 :CALL &FFF7 ENDPROC

Replacement routines for the EQUate and OSCLI commands

Where the table says to use *=pass* to terminate the routine, replace it with the name of the variable you have used as assembler pass number instead.

Another important point is the less work we have to do on your submission, the greater the chance it has of being published. This relates to badly documented programs in particular.

When preparing to submit your routine do not forget to enclose your full name, address and daytime telephone number in case we need to contact you. Also include a declaration stating that your routine is all your own work, has not been submitted elsewhere, and that we have your permission to use it in this column.

The address to send your routines to is: Stephen Wade, Routine Matters, The Micro User, Europa House, Adlington Park, Macclesfield, SK10 4NP.

Smooth screen fader

Author : Matthew Edgar Language : ARM code Filename : FadeSrc

Over the past few years, software houses have begun to employ a technique by which the displayed screen gently fades away into the distance, rather than just abruptly clearing – thus making their software appear more professional and attractive.

This feature can be seen on many quality games – and also on more recent public domain graphics demonstrations – available for the Archimedes and its rival machines, all of which support many colours more than those found on the 8-bit micros. The program presented here is a short piece of ARM code which allows you to incorporate this idea easily in your own programs.

Running the program generates a utility by the name of Fade in the currently selected directory of your disc. At the point in your program that you wish to fade out the screen, simply insert the *Fade command.

The program works by taking each colour in turn and redefining the levels of red, green and blue it contains, using a loop structure, until the desired black is reached in every colour.

For each of the three RGB levels that make up the displayed colour, the redefinition process is as follows: Load the current value Find the new value by calculation If

```
   10 REM >FadeSrc
   20 REM Produces a smooth fade in
   30 REM sixteen colour modes
   40 REM by Matthew Edgar
   50 REM (c) The Micro User
   60 REM September 1990
   70 CLS
   80 ptr=1:done=3:sixteen=4:colour=5
   90 DIM code% 256
  100 FOR pass=0 TO 2 STEP 2
  110 P%=code%:[OPT pass
  120 STMFD R13!,{R0-R5} \ Push work reg
isters onto stack
  130 MOV done,#16
  140 MOV sixteen,#16
  150 .wait
  160 MOV R0,#19
  170 SWI "OS_Byte" \ wait...
  180 SWI "OS_Byte" \ ...and again
  190 MOV colour,#15
```

Decimal numbers from 6502

Author : Pete Dawes Language : 6502 code Filename : Decimal

One of the drawbacks of using 6502 assembly language in everyday programming is the lack of an easy method of printing out decimal numbers, or – even more so – converting a hexadecimal number stored at a two-byte address into the format of a decimal Ascii string.

To the rescue comes this short utility which permits us to perform the conversion with ease. Type in the program and save it to your cassette or disc.

When the routine is executed, a piece of code is generated which is stored in the area of memory usually used for user-defined character definitions – addresses &C00 onwards. The program then runs a short demonstration to show how easy it is to use the routine.

Because the code operates using a number stored in two locations of memory, it has a range of &0000 to &FFFF – 0 to 65535 in decimal. This should be sufficient for most needs but the program can be extended to work with a greater range.

To use the code in your own assembler programs, store the hexadecimal number you wish to print out at addresses &80 and &81 – high-byte and low-byte respectively – then make a JSR to &C00.

The value returned will then be automatically printed out on the screen, so any labels – as the demonstration routine shows – should be printed up before entry. In a game for example, the string "Score =" would be permanently displayed on screen, and the routine used to update the score itself when necessary.

If you wish the value to be converted into decimal Ascii string format but not printed out – just left in the memory buffer instead – then remove lines 350 to 410. This will cause the string to be stored in locations &85 to &89 from where you can retrieve it as required.

Program lines	Function performed
110 to 140	Blank out the memory area where the converted decimal string will be stored
180	Set index for sixteen bits
200 to 330	Rotate all bits and form the converted string character by character
340	Repeat until the index reaches zero
350 to 410	Print out the string
420	Return to calling routine

Budding 6502 programmers wishing to learn more about the intricacies of the program should be able to decipher the coding easily enough for themselves, because it is written in a well-ordered manner and contains a simple loop structure.

One final word, if you are going to be using this program on one of the Master series micros which is connected to an Econet system, you will need to relocate the code to a more suitable address – for example &900. This is because page &C is part of the private Econet workspace on these micros.

```
   10 REM Decimal number output from
   20 REM 6502 assembly language
   30 REM by Pete Dawes
   40 REM (c) The Micro User
   50 REM September 1990
   60 MODE 7:hex=&80:work=&82
   70 decimal=&84:oswrch=&FFEE
   80 FOR pass=0 TO 2 STEP 2
   90 P%=&C00:[OPT pass
  100 .reset
  110 LDA #0
  120 STA decimal+0:STA decimal+1
  130 STA decimal+2:STA decimal+3
  140 STA decimal+4:STA decimal+5
  150 .convert
  160 LDA #0
  170 STA work:STA work+1
  180 CLC:LDX #16
  190 .loop
  200 ROL hex:ROL hex+1
  210 ROL work:ROL work+1
  220 SEC:LDA work
  230 SBC #10:TAY
  240 LDA work+1
  250 SBC #0:BCC less
  260 STY work:STA work+1
  270 .less
  280 DEX:BNE loop
  290 ROL hex:ROL hex+1
  300 CLC:LDA work
  310 ADC #48
  320 JSR concatenate
  330 LDA hex:ORA hex+1
  340 BNE convert
  350 LDX decimal
  360 LDY #1
  370 .print
  380 LDA decimal,Y
  390 JSR oswrch
  400 INY:DEX
  410 BNE print
  420 RTS
  430 .concatenate
  440 PHA:LDY decimal
  450 BEQ zero
  460 .move
  470 LDA decimal,Y
  480 STA decimal+1,Y
  490 DEY:BNE move
  500 .zero
  510 PLA
  520 STA decimal+1
  530 INC decimal
  540 RTS
  550 ]:NEXT pass
  560 REM Demonstration routine
  570 !hex=&FFFF:PROCdo
  580 !hex=&8000:PROCdo
  590 !hex=&0:PROCdo
  600 !hex=&E31D:PROCdo
  610 !hex=&730:PROCdo
  620 !hex=&C00:PROCdo
  630 END
  640 DEF PROCdo
  650 PRINT TAB(7)"Hexadecimal =
&";STR$
~!hex:PRINT "Decimal equivalent = ";
  660 CALL &C00
  670 PRINT:PRINT
  680 ENDPROC
```

---

negative then correct the result Store the new value

Lines 250 to 390 contain the code used to perform the above functions. This is done after the palette has been read using osword, and once completed, the new palette is saved, again using osword.

Because of the way the redefinition is carried out, the program does not fade out the screen border or the pointer. The remedy is to use a black border as standard in all programs which the routine is to be used in, and to switch off the pointer before the routine is called – or, if possible, not use it at all.

Flicker is reduced by using osbyte 19 which waits until the screen is next updated before allowing the following instructions to be carried out. As it stands, the routine will not work in 256 colour modes and functions best in those with sixteen exactly, such as Mode 12.

```
  200 ADR ptr,data
  210 .nextcolour
  220 STRB colour,[ptr]
  230 MOV R0,#11
  240 SWI "OS_Word"     \ read palette
  250 .red
  260 LDRB R0,[ptr,#2] \ current value
  270 SUBS R0,R0,sixteen
  280 MOVMI R0,#0       \ find new value
  290 STRB R0,[ptr,#2] \ store new value
  300 .green
  310 LDRB R0,[ptr,#3] \ current value
  320 SUBS R0,R0,sixteen
  330 MOVMI R0,#0       \ find new value
  340 STRB R0,[ptr,#3] \ store new value
  350 .blue
  360 LDRB R0,[ptr,#4] \ current value
  370 SUBS R0,R0,sixteen
  380 MOVMI R0,#0       \ find new value
  390 STRB R0,[ptr,#4] \ store new value
  400 STRB sixteen,[ptr,#1] \ define col
our from RGB values
  410 MOV R0,#12
  420 SWI "OS_Word" \ write palette
  430 SUBS colour,colour,#1
  440 BGE nextcolour
  450 SUBS done,done,#1
  460 BNE wait
  470 LDMFD R13!,{R0-R5} \ pull register
s back from stack
  480 MOVS PC,R14 \ return from routine
  490 .data
  500 EQUD 0:EQUD 0
  510 ]:NEXT
  520 OSCLI"SAVE Fade "+STR$~code%+" "+S
TR$~P%
  530 *SETTYPE Fade Utility
  540 PRINT''"Code saved. *Fade to use."
```

Monthly cassette and disc

All of this month's routines can be found on the monthly subscription disc or cassette. On the cassette and 5.25in disc the programs reside in the "R" directory, and on the 3.5 inch disc in the "RoutMats" directory.

Any routines designed to work with the Archimedes series and A3000 micros are ready file-typed on the 3.5in disc for your benefit – they are the ones without a blank icon when looked at in the desktop environment. Please note that those routines specific to the 32-bit micros are not stored on the 5.25in disc or the cassette.

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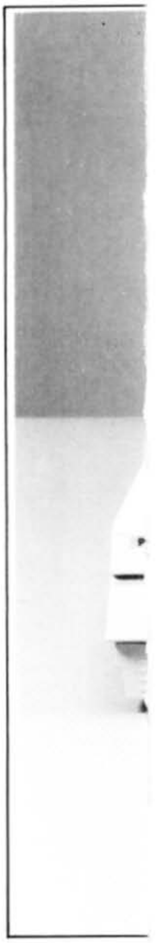
Upgradeable to Impression: Junior owners can upgrade to the full blown Impression for the difference in price, at any time • File compatible with Impression - documents saved with Impression Junior are directly loadable into other versions • Fully RISC OS compatible with direct links to !Draw, !Paint & other applications • Ideal for 1Mbyte machine owners • No hardware protection.

The manual includes a step-by-step introduction to Impression Junior. The tutorials take you, from scratch, through creating simple letters, multi-page documents and typical DTP type pages. The package also includes the highly acclaimed 'DTP at a glance' book.

If you have been overwhelmed by the capabilities of other DTP programs, or



enhanced word processing

IMPRESSION
Junior
IMPRESSION
Junior

simply don't require all the powerful features these may provide, then Impression Junior is the answer. And remember it is part of a family of products so that as your experience grows and your requirements evolve there is always a version of Impression to suit.

There can never be one single product that caters for all word processing and DTP requirements, and so Impression Junior has been created specifically for those new to DTP or those who want to take their word processing one step further.

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RRP £89.95+VAT (£103.44)

Computer Concepts Ltd

Gaddesden Place, Hemel Hempstead, Herts.
HP2 6EX. Tel (0442) 63933 Fax (0442) 231632

```
130 LDA&4001,X:STA&73
140 .draw
150 LDA(&72),Y:STA(&70),Y
160 INY:DEC &3FFF:BNEdraw
170 LDA&70:CLC:ADC#&20
180 STA&70:LDA&71:ADC#&0
190 STA&71:INX:INX:DEC &3FFE
200 BNEloop:RTS
210 .CarCode
220 LDY#0
230 .loop
240 LDX#&10
250 .draw
260 LDA(&72),Y:STA(&70),Y
270 INY:DEX:BNEdraw
280 LDA&70:CLC:ADC#&30
290 STA&70:LDA&71:ADC#&1
300 STA&71:DEC&76:BNEloop
310 RTS:]:NEXT
320 *SAVE CarCode 700+100
```

Get it right

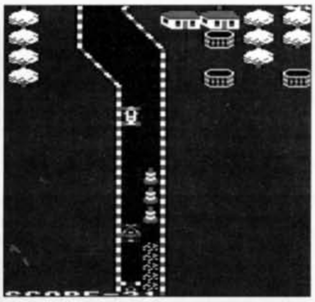
```
 10 =    0 0
 20 =    0 0
 30 =    0 0   130 =  18E A   230 =  325 0
 40 = A16E E   140 = D43C B   240 = 6C2A D
 50 = A418 1   150 = CB4D A   250 = D43C 3
 60 = 834E 4   160 = 2087 5   260 = CB4D D
 70 = 34A2 3   170 = CD58 6   270 =  FCF C
 80 =  E1A 7   180 = 4750 1   280 = FE69 7
 90 = 8145 8   190 = 6247 4   290 = 5771 B
100 =  325 6   200 = 79FD C   300 = 1313 C
110 =  A81 2   210 = 1A5D D   310 = 99A1 1
120 = 7EEA 0   220 = 9B97 C   320 = 41C0 7
```

All program listings in this issue can be downloaded FREE on...
MicroLink

Listing II

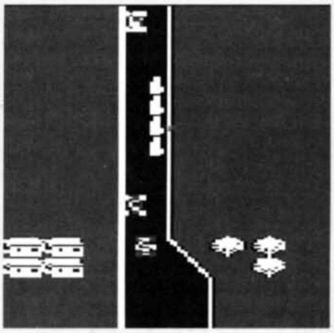
```
 10 REM Car Race Listing II
 20 REM by Mike Goldberg
 30 REM (c) The Micro User
 40 HIMEM=&5000:H%=HIMEM
 50 B%=&700:B%?0=ASC"&":B%?3=13
 60 T%=FNstart:Q%=FALSE:X%=ASC"X"
 70 REPEAT T%=T%+5:REPEAT
 80 IF T%?1<>X% PROCput ELSE Q%=TRUE
 90 T%=T%+3:UNTIL ?T%=13 OR Q%
100 UNTIL Q%:X%=&700:Y%=X%DIV256
110 $X%="SAVE Ikons 5000 "+STR$~H%
120 CALL&FFF7:END
130 :
140 DEF PROCput:VDU46
150 B%?1=T%?1:B%?2=T%?2:N%=EVAL$B%
160 FOR L%=1 TO ?T%-32
170 ?H%=N%:H%=H%+1:NEXT:ENDPROC
180 :
190 DEF FNstart:LOCAL P%
200 P%=PAGE:REPEAT P%=P%+P%?3
210 UNTIL $(P%+4)="START":=P%+P%?3
220 :
230 START
240 *@00(FF$8B$B80008FF$8B$B8000$1D$D1
250 *(FF$1D$D1<FF"EE"DC"8B"06"C0"80000
260 *"8B"06"C0"808004FF"EE"DC"8B"06"C0
270 *"80,FF"EE"DC"8B"06"C0"80(00@FF800
280 *"01"03"60"D1000"01"03"60"D1"3B"77
290 *$FF(00"01"03"60"D1"3B"77,FF"01"03
300 *"60"D1"3B"774FF"1D"06"30"10$FF"77
310 *"B30FF(00"1D"06"30"10$FF"77"B3(FF
320 *000"1D"06"30"10$FF"77"B3800"1D"06
330 *"30"10"08"0C"60"B8800"CD"EE$FF"08
340 *"0C"60"B8000(FF"CD"EE$FF"08"0C"60
350 *"B8(000FF"CD"EE$FF"08"0C"60"B88FF
360 *"CD"EE@FF"EE"DC"3B"77@FF"77"B39FF
370 *!EE!DC#A8!9A!8B!FF!F0%00!F0!FF!F0
380 *%00!F0!FF!77!B3#51!95!1D!8B!A9!9A
390 *"8B!A9!DC!EE!01"05!50"05!01!F0#05
400 *!50"05!04!F0!1D!59!95"1D!59!B3!77
410 *"FF!EE"DC"B8"DC!30%F0!F8!91!E0&F0
420 *"FF!77!B3!D1!D9!B3!D1!A8!98!A8!DC
430 *!EE#FF!E0!50!F4!C1!21#CD!F1!F2!F8
440 *!38!48#3B"D1!B3!77$FF!F3!83!C3!83
450 *!50"58!78!FF'0F000!18$1E!0E!0F!FF
460 *!87!07!87!07!C3!43!41!71100!99!33
470 *!74!65!74!FF!FE!00!AA!EE!C4!D5!E6
480 *!CC!99"00$01!21!30"00$08!48!C0"FE
490 *!FF#76"33!00!AA!EE!CC!DD!C4!EE!88
500 *!12!03!21!34!16"07!03!84!0C!48!C2
510 *!86"0E!0C"00$01!21!30"00$08!48!C0
520 *!00!99!33!74!65!74!FF!FE!00!AA!EE
530 *!C4!D5!E6!CC!99!12!03!21!34!16"07
540 *!03!84!0C!48!C2!86"0E!0C"FE!FF#76
550 *"33!00!AA!EE!CC!DD!C4!EE!88"00$01
560 *!21!30"00$08!48!C0000!12!03!21!34
570 *!16"07!03!84!0C!48!C2!86"0E!0CB00
580 *$01!21!30"00$08!48!C0000!12!03!21
590 *!34!16"07!03!84!0C!48!C2!86"0E!0C
600 *!0F!F0!80!E1!21!E1!01"0F!F0!A0!B4
610 *!A4!A5!05"0F!F0!A0!B4!A4!A5!05"0F
620 *!F0!A0!25"A5!05!0F!FF!F2!B2!F2!B2
630 *!F6!66"FF!F8!D8#FA!AA"FF#FA!EA!FA
640 *!AA"FF!F2!72!F0!D0!F2!22!FF!EE!89
650 *!07!0F!07!83!C1!A0!00&0F"00&0F!00
660 *!33"1D"0E"0F!00"90!94!D2!70!B8!DC
670 *!EE!F0#C0!C3!C0#F0'96!F0#30!3C!30
680 *"F03FF!DD!EE!CC%FF!55!33!11%FF!DD
690 *!EE!CC%FF!55!33!112FF`00!80!84!82
700 *!05!10!23!45!46!10!12!14!0A!80!4C
710 *!2A!26"46!17!57!01!D3"C0"26!8E!AE
720 *!08!BC"30!03!43"8F!8C!0E"0B!0C!2C
730 *"1F!13!07"0D!0B!0A"0C!4B!8D!EF!EE
740 *!0D!05"03!2D!1B!7F!77!02!07!2D#34
750 *!1A!05!02!80!29!C3!86!85!E0!C3!0C
760 *!0B!0F!01!EE!EF!FE!EE!0F!0D!0F!08
770 *!77!7F!F7!77!02!25!12!96!5A!34!1A
780 *!05!81!A1"C2!D2!E1!E0!C3!0C!0A!0D
790 *!01!EE!EF!FE!EE!0D!00!07!08!77!7F
800 *!F7!77!02!08!03!14!12!01!08!05!00
810 *!09!84!C2!C0!85!08!03!0E!02!0D!01
820 *!EE!EF!FE!EE!0D!0A!07!08!77!7F!F7
830 *!77!00!02!43!01!05!06!51!1C!00!33
840 *!3B!3F!37!88!20!83!0C!0B!0F!01!EE
850 *!EF!FE!EE!03!0D!0F!08!77!7F!F7!77
860 *000!10!00!20!50!00!40!10"00!40!20
870 *!40!00!A0"00!1C!2D!1C!20!64!71!75
880 *!65!83!4B!83!40!62!E8!EA!6A!74"65
890 *!30!1C!1E!3C!0C!E2"6A!C0!83!87!C3
900 *!03!CC!ED"CD!13!02!40!1C!33!7B"3B
910 *!8C!04!20!83!0C!0B!0F!01!EE!EF!FE
920 *!EE!03!0D!0F!08!77!7F!F7!77!D1!D3
930 *!D1!11!23!46!64!77!B8!BC!B8!88!4C
940 *!26!62!EE!75!54!74!10"D1!D3!C0!EA
950 *!A2!E2!80"B8!BC!30@00XXX
```

```
 10 =    0 0   170 =  D74 0   330 = 5072 2   490 = 7476 F   650 =  343 9   810 = 7AA3 7
 20 =    0 0   180 = 9719 7   340 = 9DFD F   500 = AC51 D   660 = 65EC C   820 = 614E E
 30 =    0 0   190 = C076 C   350 = 9B88 2   510 = 9575 3   670 = FC89 1   830 = 9976 3
 40 = 6472 2   200 = 3D36 E   360 = ACEF 1   520 = 3598 0   680 = DC26 8   840 = 8631 5
 50 =   62 5   210 = 76FD 8   370 =  99B A   530 = F638 8   690 = C669 5   850 = 379A E
 60 = FE1C A   220 = 9719 3   380 =  554 4   540 = AEC5 A   700 = 7197 3   860 = 2AAA D
 70 = 9D94 5   230 = 1C1B 1   390 = C0D6 2   550 = BE7D 4   710 = A147 F   870 = 1323 F
 80 = 7C21 9   240 = BB5B B   400 = AC46 6   560 = 4651 E   720 = BE09 5   880 = C058 4
 90 = 10F6 6   250 = 49F6 2   410 = 99BB E   570 = C118 8   730 = 2580 8   890 = 561D C
100 = 304E 6   260 = 19C5 4   420 = 9B88 2   580 = CA14 E   740 = 56CA 9   900 = A247 C
110 = 6009 1   270 = 3D71 1   430 = 7DAE 4   590 = 82BB 2   750 = 71F7 A   910 = FAB6 2
120 = 5CA1 D   280 = 42DC 2   440 = B0DC 8   600 = 4814 B   760 = 6FEB C   920 = E788 5
130 = 9719 1   290 = 515C E   450 = 280D C   610 = C964 5   770 = B86B 8   930 = 5468 6
140 = AEAE F   300 = 56AB F   460 = B405 5   620 = AC96 0   780 = F83E 6   940 = 7F95 6
150 = B041 9   310 = AC52 7   470 = 99C3 9   630 = 337A F   790 = 5C81 3   950 = 1C53 7
160 = ACA7 C   320 = DE79 C   480 = DF5D 5   640 = 25E7 3   800 = 6D00 F
```



Listing III

```
 10 REM Car Race Listing III
 20 REM by Mike Goldberg
 30 REM (c) The Micro User
 40 DATA2,0,4,9,9,9,9,9
 50 DATA9,2,0,4,9,9,9,9
 60 DATA9,9,2,0,4,9,9,9
 70 DATA9,9,9,2,0,4,9,9
 80 DATA9,9,9,9,2,0,4,9
 90 DATA9,9,9,9,9,2,0,4
100 DATA23,6,0,4,9,27,29,9
110 DATA9,5,0,4,9,26,28,9
120 DATA43,8,0,4,29,9,9,9
130 DATA42,7,0,4,28,9,9,9
140 DATA2,0,13,9,9,27,9,29
150 DATA2,0,12,9,43,26,29,28
160 DATA2,0,11,9,42,9,28,9
170 DATA2,0,10,24,9,9,9,9
180 DATA23,6,0,13,9,29,29,27
190 DATA9,5,0,12,9,28,28,26
200 DATA9,8,0,11,9,9,9,9
210 DATA9,7,0,10,24,9,9,9
220 DATA27,23,6,0,4,43,9,9
230 DATA26,29,5,0,4,42,9,29
240 DATA9,28,8,0,4,43,29,28
250 DATA9,9,7,0,4,42,28,9
260 DATA29,2,0,13,9,29,9,43
270 DATA28,2,0,12,9,28,29,42
280 DATA9,2,0,11,9,9,28,43
```



```
290 DATA9,2,0,10,24,9,9,42
300 DATA29,27,2,0,13,27,27,29
310 DATA28,26,2,0,12,26,26,28
320 DATA29,9,2,0,11,9,9,29
330 DATA28,9,2,0,10,24,9,28
340 DATA43,29,23,6,0,4,29,9
350 DATA42,28,29,5,0,4,28,9
360 DATA43,9,28,8,0,4,29,29
370 DATA42,9,9,7,0,4,28,28
380 DATA29,29,27,2,0,13,9,43
390 DATA28,28,26,2,0,12,29,42
400 DATA9,9,9,2,0,11,28,43
410 DATA9,9,9,2,0,10,24,42
420 DATA29,29,29,23,6,0,4,27
430 DATA28,28,28,43,5,0,4,26
440 DATA29,29,29,42,8,0,4,29
450 DATA28,28,28,9,7,0,4,28
460 DATA29,29,9,9,2,0,13,9
470 DATA28,28,29,29,2,0,12,9
480 DATA29,29,28,28,2,0,11,9
490 DATA28,28,9,9,2,0,10,24
500 DATA9,9,27,27,23,6,0,4
510 DATA9,29,26,26,9,5,0,4
520 DATA29,28,9,9,9,8,0,4
530 DATA28,9,9,9,9,7,0,4
540 DATA9,9,29,29,9,21,0,4
550 DATA43,43,28,28,9,20,0,4
560 DATA42,42,29,29,9,19,0,4
570 DATA9,9,28,28,22,18,0,4
580 DATA29,9,27,43,2,0,17,25
590 DATA28,29,26,42,2,0,16,9
600 DATA9,28,9,43,2,0,15,29
610 DATA9,9,9,42,2,0,14,28
620 DATA9,27,27,9,21,0,4,9
630 DATA9,26,26,29,20,0,4,9
640 DATA9,9,9,28,19,0,4,9
650 DATA9,9,9,22,18,0,4,9
660 DATA9,9,9,2,0,17,25,27
670 DATA9,9,9,2,0,16,9,26
680 DATA29,29,29,2,0,15,43,9
690 DATA28,28,28,2,0,14,42,9
700 DATA27,9,9,21,0,4,9,9
710 DATA26,29,29,20,0,4,29,9
720 DATA9,28,28,19,0,4,28,9
730 DATA9,9,22,18,0,4,9,9
740 DATA43,43,2,0,17,25,29,9
750 DATA42,42,2,0,16,9,28,9
760 DATA43,43,2,0,15,29,29,9
770 DATA42,42,2,0,14,28,28,9
780 DATA29,9,21,0,4,27,9,27
790 DATA28,9,20,0,4,26,9,26
800 DATA29,9,19,0,4,9,29,9
810 DATA28,22,18,0,4,9,28,9
820 DATA29,2,0,17,25,27,29,29
830 DATA28,2,0,16,9,26,28,28
840 DATA29,2,0,15,43,43,29,29
850 DATA28,2,0,14,42,42,28,28
860 DATA9,21,0,4,29,9,9,9
870 DATA9,20,0,4,28,9,29,29
880 DATA9,19,0,4,9,29,28,28
890 DATA22,18,0,4,9,28,9,9
900 DATA2,0,17,25,9,9,27,27
910 DATA2,0,16,29,29,9,26,26
920 DATA2,0,15,28,28,9,9,9
930 DATA2,0,14,9,9,9,9,9
940 DATA43,23,6,0,13,9,9,27
950 DATA42,9,5,0,12,9,9,26
960 DATA43,29,8,0,11,9,29,9
970 DATA42,28,7,0,10,24,28,9
980 DATA9,9,23,6,0,13,43,43
990 DATA29,29,29,5,0,12,42,42
1000 DATA28,28,28,8,0,11,9,9
1010 DATA9,9,9,7,0,10,24,9
1020 DATA9,27,27,23,6,0,13,9
1030 DATA9,26,26,9,5,0,12,29
1040 DATA43,43,43,43,8,0,11,28
1050 DATA42,42,42,42,7,0,10,24
1060 DATA27,29,9,9,21,0,17,25
1070 DATA26,28,29,9,20,0,16,9
1080 DATA9,9,28,9,19,0,15,9
1090 DATA9,9,9,22,18,0,14,9
1100 DATA9,29,9,21,0,17,25,27
1110 DATA29,28,9,20,0,16,9,26
1120 DATA28,29,9,19,0,15,9,9
1130 DATA9,28,22,18,0,14,9,9
1140 DATA43,43,21,0,17,25,27,43
1150 DATA42,42,20,0,16,9,26,42
1160 DATA9,9,19,0,15,29,9,29
1170 DATA9,22,18,0,14,28,9,28
1180 DATA9,21,0,17,25,29,29,9
1190 DATA9,20,0,16,9,28,28,9
1200 DATA9,19,0,15,9,29,29,29
1210 DATA22,18,0,14,9,28,28,28
1220 DATA2,0,0,4,9,9,9,9
1230 DATA9,2,0,0,4,9,9,9
1240 DATA9,9,2,0,0,4,9,9
1250 DATA9,9,9,2,0,0,4,9
```

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```
1260 DATA9,9,9,9,2,0,0,4
1270 DATA2,31,0,4,43,43,43,43
1280 DATA2,30,0,4,42,42,42,42
1290 DATA2,0,31,4,43,43,43,43
1300 DATA2,0,30,4,42,42,42,42
1310 DATA43,2,31,0,4,29,29,29
1320 DATA42,2,30,0,4,28,28,28
1330 DATA29,2,0,31,4,43,43,43
1340 DATA28,2,0,30,4,42,42,42
1350 DATA27,27,2,31,0,4,27,27
1360 DATA26,26,2,30,0,4,26,26
1370 DATA27,29,2,0,31,4,29,27
1380 DATA26,28,2,0,30,4,28,26
1390 DATA43,43,43,2,31,0,4,9
1400 DATA42,42,42,2,30,0,4,9
1410 DATA9,9,29,2,0,31,4,29
1420 DATA9,9,28,2,0,30,4,28
1430 DATA43,43,43,43,2,31,0,4
1440 DATA42,42,42,42,2,30,0,4
1450 DATA27,27,27,9,2,0,31,4
1460 DATA26,26,26,9,2,0,30,4
1470 DATA2,33,0,4,45,45,45,45
1480 DATA2,32,0,4,44,44,44,44
1490 DATA2,0,35,4,9,45,45,9
1500 DATA2,0,34,4,9,44,44,9
1510 DATA45,2,33,0,4,45,45,45
1520 DATA44,2,32,0,4,44,44,44
1530 DATA9,2,0,33,4,9,9,9
1540 DATA9,2,0,32,4,9,9,9
1550 DATA9,9,2,35,0,4,9,9
1560 DATA9,9,2,34,0,4,9,9
```

```
1570 DATA9,9,2,0,33,4,9,9
1580 DATA9,9,2,0,32,4,9,9
1590 DATA45,45,45,2,35,0,4,9
1600 DATA44,44,44,2,34,0,4,9
1610 DATA45,45,45,2,0,35,4,9
1620 DATA44,44,44,2,0,34,4,9
1630 DATA45,45,45,45,2,33,0,4
1640 DATA44,44,44,44,2,32,0,4
1650 DATA45,45,45,45,2,0,35,4
1660 DATA44,44,44,44,2,0,34,4
1670 DATA2,37,4,9,9,9,9,9
1680 DATA2,36,4,9,9,9,9,9
1690 DATA2,39,4,9,9,9,9,9
1700 DATA2,38,4,9,9,9,9,9
1710 DATA9,2,37,4,9,9,9,9
1720 DATA9,2,36,4,9,9,9,9
1730 DATA9,2,39,4,9,9,9,9
1740 DATA9,2,38,4,9,9,9,9
1750 DATA9,9,2,37,4,9,9,9
1760 DATA9,9,2,36,4,9,9,9
1770 DATA9,9,2,39,4,9,9,9
1780 DATA9,9,2,38,4,9,9,9
1790 DATA9,9,9,2,37,4,9,9
1800 DATA9,9,9,2,36,4,9,9
1810 DATA9,9,9,2,39,4,9,9
1820 DATA9,9,9,2,38,4,9,9
1830 DATA9,9,9,9,2,37,4,9
1840 DATA9,9,9,9,2,36,4,9
1850 DATA9,9,9,9,2,39,4,9
1860 DATA9,9,9,9,2,38,4,9
1870 DATA9,9,9,9,9,2,37,4
1880 DATA9,9,9,9,9,2,36,4
1890 DATA9,9,9,9,9,2,39,4
1900 DATA9,9,9,9,9,2,38,4
1910 DATA2,0,4,9,9,9,9,9
1920 DATA9,2,0,4,9,9,9,9
1930 DATA9,9,2,0,4,9,9,9
1940 DATA9,9,9,2,0,4,9,9
1950 DATA9,9,9,9,2,0,4,9
1960 DATA9,9,9,9,9,2,0,4
1970 DATA9,9,40,0,0,40,9,9
1980 DATA9,9,41,0,0,41,9,9
1990 DATA9,9,21,0,0,13,9,9
2000 DATA9,9,20,0,0,12,9,9
2010 DATA9,9,19,0,0,11,9,9
2020 DATA9,22,18,0,0,10,24,9
2030 DATA9,2,0,0,0,0,4,9
2040 DATA9,2,0,4,2,0,4,9
2050 DATA9,2,39,4,2,0,4,45
2060 DATA9,2,38,4,2,0,4,44
2070 DATA45,2,37,4,2,0,4,9
2080 DATA44,2,36,4,2,0,4,9
2090 DATA29,2,31,4,2,0,4,27
2100 DATA28,2,30,4,2,0,4,26
2110 DATA29,2,0,4,2,31,4,29
2120 DATA28,2,0,4,2,30,4,28
2130 DATA27,2,0,4,2,39,4,27
2140 DATA26,2,0,4,2,38,4,26
2150 DATA43,2,0,4,2,37,4,29
2160 DATA42,2,0,4,2,36,4,28
2170 DATA29,2,0,13,21,0,4,29
2180 DATA28,2,0,12,20,0,4,28
2190 DATA9,2,0,11,19,0,4,9
2200 DATA9,2,0,10,18,0,4,9
2210 DATA29,23,6,0,0,17,25,29
2220 DATA28,9,5,0,0,16,9,28
2230 DATA9,9,8,0,0,15,9,9
2240 DATA9,9,7,0,0,14,9,9
2250 DATA29,2,0,17,6,0,4,29
2260 DATA28,2,0,16,5,0,4,28
```

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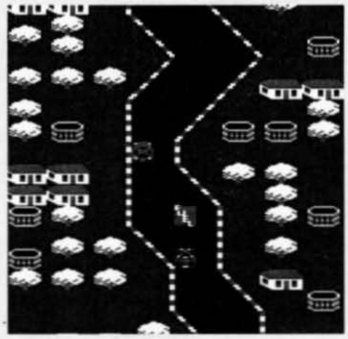
```
 2270 DATA9,2,0,15,8,0,4,9
 2280 DATA9,2,0,14,7,0,4,9
 2290 DATA43,2,35,4,2,0,4,29
 2300 DATA42,2,34,4,2,0,4,28
 2310 DATA27,2,0,4,2,33,4,27
 2320 DATA26,2,0,4,2,32,4,26
 2330 ENVELOPE1,1,1,-1,0,1,1,0,126,-1,-1
,-1,126,120
 2340 ENVELOPE2,1,20,-2,-1,5,5,5,127,-1,
-1,-1,110,90
 2350 ENVELOPE3,1,-2,0,0,250,0,0,126,-1,
-1,-1,0,0
 2360 ENVELOPE4,130,-2,0,0,30,0,0,126,-1
,-3,-4,110,20
 2370 *LOAD CarCode
 2380 *LOAD Ikons
 2390 PROCrows
 2400 PAGE=&1100:CHAIN"RACE"
 2410 END
 2420 DEFPROCrows
 2430 R%=&4F4E
 2440 FORI%=&4100 TO R% STEP2:VDU46
 2450 READ N%:!I%=&5000+(N%*&20):NEXT
 2460 ENDPROC
```

Get it right ✓

```
  10 =    0 0   320 = 3932 C   630 = 39E6 1   940 =  38C 5  1250 =  732 D  1560 = 7A9C F  1870 =  3C4 7  2180 = A788 3
  20 =    0 0   330 = 61AD 2   640 = 3F71 2   950 = 7C72 D  1260 = 6E07 5  1570 = 8DA6 D  1880 = 34F4 F  2190 = E8DC 2
  30 =    0 0   340 = 1268 D   650 = 13D1 D   960 = 15B9 3  1270 = C1A6 0  1580 = 35C7 4  1890 = 18C5 9  2200 = 3FF8 C
  40 = 63B1 1   350 = D718 C   660 = 9802 5   970 = B0BA 9  1280 = 60F5 7  1590 = F079 C  1900 = 2FF5 F  2210 = C49D 0
  50 = 2263 2   360 = 3362 2   670 = 9705 5   980 = 306A E  1290 = FF43 E  1600 = 15A0 A  1910 = 63B1 D  2220 = 6B78 B
  60 = 30CA B   370 = B265 B   680 = E638 6   990 = A21E F  1300 = E00E 9  1610 = D86B 3  1920 = 2263 8  2230 = 1B95 7
  70 = CC65 1   380 = 92AC E   690 = A7F0 9  1000 = 5196 4  1310 = 66A2 C  1620 = 2F82 2  1930 = 30CA 8  2240 = A227 6
  80 = 636A B   390 = C7F3 1   700 = 13F9 1  1010 = B6A4 C  1320 = 1D28 9  1630 = 57B5 A  1940 = CC65 1  2250 = 7B7E B
  90 = 61AB 6   400 = EA83 F   710 = 8D95 9  1020 = 13BA 3  1330 = A680 A  1640 = A1F9 D  1950 = 636A D  2260 = DC8D 8
 100 = 4A3A B   410 =  DF1 B   720 = AA8E 3  1030 = 5EE1 4  1340 = A51E 7  1650 = DC4F 6  1960 = 61AB 9  2270 = 77ED C
 110 = DE4E B   420 = 5EA9 2   730 = BB5B D  1040 = 1C93 1  1350 = 9C04 C  1660 = B762 6  1970 = 455D 9  2280 = 1627 A
 120 = 45BA 2   430 = 4451 0   740 = B0DE B  1050 = B586 7  1360 = 54E3 4  1670 =  A61 C  1980 = EC79 0  2290 = FD79 4
 130 = CE92 2   440 = BFC7 9   750 = 90E7 F  1060 =  11A F  1370 = BD46 D  1680 = 4F02 E  1990 = 6490 4  2300 = FECF 4
 140 = EE43 3   450 = 9FE1 6   760 = 7D5A 6  1070 = 1DE8 5  1380 = 46CB 5  1690 = 8E50 1  2000 = CDB4 B  2310 = 66C3 D
 150 = 5014 A   460 = A1B0 C   770 = 92D2 C  1080 =  6A9 D  1390 = EC0E E  1700 = CB33 7  2010 = F41E 4  2320 = 23A0 9
 160 = BD83 F   470 = 96AB F   780 = F429 D  1090 = FE29 5  1400 =  9D7 1  1710 = 58F9 9  2020 = 9C32 3  2330 = 8C02 0
 170 = 43F2 A   480 = 93E6 5   790 = 14FA C  1100 = BE5A 1  1410 = BE6E 4  1720 = 80B0 9  2030 = 7F6D 9  2340 = D67F 0
 180 = E1B7 1   490 = 7AF7 0   800 = C9F9 F  1110 = B07C 7  1420 = AE8C D  1730 =  B83 8  2040 = 8361 4  2350 =  EA0 E
 190 = 3B88 1   500 = 5F82 5   810 = 1726 1  1120 = 99EF B  1430 = CB59 5  1740 = D3CA 7  2050 = 850A C  2360 = DA6F F
 200 = A4E7 A   510 = 57C1 E   820 = 4993 F  1130 = 8FEC 1  1440 = 3D15 4  1750 = B764 D  2060 = 965E 4  2370 = F20B 4
 210 = 7A85 2   520 = 3992 3   830 = 4312 A  1140 = F34E 5  1450 = 2B3B C  1760 = 5C47 2  2070 = B405 9  2380 = 4DDD 8
 220 = 6D81 2   530 = ADE6 D   840 =   13 1  1150 = 41D5 0  1460 = 41B3 0  1770 = C413 1  2080 = C468 5  2390 = BCA8 C
 230 = 5723 A   540 = 7489 3   850 = C172 9  1160 = D4BB 3  1470 = 75A7 7  1780 = 2F30 B  2090 = B753 4  2400 = 4AA8 F
 240 = ACBE 2   550 = 37EF C   860 = E47E 5  1170 = EBB2 E  1480 = D4F4 C  1790 = 8CDD 2  2100 = B4E5 A  2410 = FD2E A
 250 =   41 6   560 =  D6E E   870 = 272B A  1180 = 83CC 0  1490 = 5207 F  1800 = 34BC 8  2110 = E911 C  2420 = 565F 7
 260 = C812 1   570 = A510 8   880 = 5E09 C  1190 =  5F3 F  1500 = 65F4 6  1810 = BE55 B  2120 = AC72 A  2430 = 6F48 5
 270 =  116 9   580 = DC67 E   890 = 2A77 E  1200 = 84EF 6  1510 = 4F5D 5  1820 =  634 5  2130 = E0C1 8  2440 =  F3D F
 280 = 57C4 9   590 = 296D 9   900 = 5B1A C  1210 = B2AA 6  1520 = 34D7 A  1830 = 3FDA F  2140 = A5A2 2  2450 = A673 7
 290 = 1266 4   600 = B07C A   910 = 9600 5  1220 = 6CC5 2  1530 = 4BA9 E  1840 = 958B B  2150 = C2C0 6  2460 = ED0F A
 300 = 2412 0   610 = DD07 3   920 = 2700 E  1230 = 5486 8  1540 = A08A 9  1850 = F072 8  2160 = 87A3 3
 310 = B0F2 1   620 = FC4A C   930 = 77D0 4  1240 = D076 7  1550 = 91BF D  1860 = 5A23 C  2170 = D802 6
```

Listing IV

```
   10 REM Car Race Listing IV
   20 REM By Mike Goldberg
   30 REM (c) The Micro User
   40 DIMHS%(8),HS$(8)
   50 hst$="TOP RACERS"
   60 FORI%=0TO7:READHS$(I%):HS%(I%)=210
0-(I%+1)*100:NEXT
   70 DATAMIKE,LEA,TOM,MABEL,DAFFY,DAISY
,CHARLIE,ATTILLA
   80 MODE7:S%=0:PROChst
   90 DIMZ%(3)
  100 Z%(0)=&5720:Z%(1)=&56E0:Z%(2)=&562
0:Z%(3)=&5600
  110 REPEAT
  120 MODE5:VDU23;8202;0;0;0;
  130 VDU19,1,1;0;19,2,3;0;19,3,4;0;
  140 ?&FE00=6:?&FE01=31
  150 ?&FE00=7:?&FE01=38
  160 PROCinit
  170 PROCstart
  180 REPEAT
  190 PROCN
  200 PROCkeys
  210 S%=S%+1
  220 IFTIME>500ANDdie%=0 E%=&56C0:die%=
1:SOUND0,-12,7,20:SOUND1,3,200,20:TIME=0
  230 UNTILTIME>500ANDdie%=1ORL%=0
  240 IFdie%=1COLOUR2:COLOUR129:PRINTTAB
(2,23)"GAME"TAB(14,23)"OVER"
  250 COLOUR2:COLOUR129:PRINTTAB(2,30)"S
CORE=";S%
  260 *FX15
  270 REPEATUNTILGET=32
  280 COLOUR128
  290 MODE7:PROChst
  300 FORI%=1TO31:VDU31,0,31,10:FORT=1TO
20:NEXT:NEXT:CLS
  310 UNTIL0
  320 END
  330 DEFPROCinit
  340 fmc%=0
  350 col%=1740
  360 S%=0
  370 L%=3
  380 RESTORE1400
  390 car%=&700
```

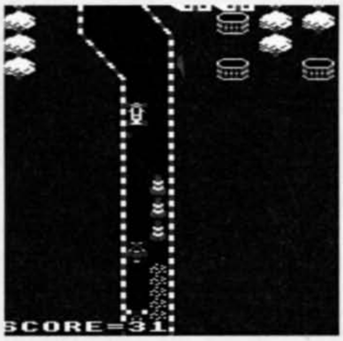


```
  400 back%=&703
  410 blank%=&5740
  420 Q%=&7EE0
  430 X%=&7558
  440 ENDPROC
  450 DEFPROCstart
  460 sk%=0:sc%=0
  470 die%=0
  480 E%=&5740
  490 g%=0:h%=0
  500 f%=0
  510 r%=0
  520 join%=0
  530 !&70=X%:!&72=&5700:?&76=2:CALLcar%
  540 end%=0
  550 FORI=1TO31:PROCN:NEXT
  560 COLOUR129:COLOUR2:PRINTTAB(1,24);L
%TAB(18,24);L%
  570 COLOUR128
  580 REPEATUNTILGET=32
  590 TIME=0
  600 ENDPROC
  610 DEFPROCN
  620 IFr%=0READN%:IFN%=-1PROCrestore
  630 C%=&4100+(N%*16)
  640 IFN%>5ANDN%<118N%=N%+1:r%=(r%+1)MO
D4
  650 FORI%=0TO12STEP4:I%!&4000=I%!C%:NE
XT:VDU30,11:!&70=X%:!&72=E%:?&76=2:CALLc
ar%:!&70=Q%:CALLback%:IFg%=1h%=h%+1:IFh%
=5h%=0:g%=0
  660 IFh%=0:IFQ%>&5960IFN%<60Rf%=1PROCb
ad
```

```
  670 Q%=Q%-320:X%=X%-320
  680 IFQ%=&56E0Q%=&7EE0
  690 IFjoin%=1join%=0:!&70=tail%:!&72=b
lank%:?&76=1:CALLcar%
  700 IFX%<&5800 ANDjoin%=0PROCjoin1
  710 !&70=X%:!&72=&5700:?&76=2:CALLcar%
  720 IF(X%-320)>&5800IFX%?-320<>0ORX%?-
312<>0PROCcrash
  730 IF(X%-320)<&5800IFX%?&26C0<>0ORX%?
&26B8<>0PROCcrash2
  740 ENDPROC
  750 DEFPROCjoin1
  760 !&70=X%+320:!&72=&5710:?&76=1:CALL
car%
  770 tail%=X%+320
  780 X%=X%+&2800
  790 join%=1
  800 ENDPROC
  810 DEFPROCkeys
  820 IFsk%=1PROCskid:ENDPROC
  830 IFINKEY-98PROCM(-8,-8):ENDPROC
  840 IFINKEY-67PROCM(8,16):ENDPROC
  850 FORT=1TO12:NEXT
  860 ENDPROC
  870 DEFPROCM(x%,y%)
  880 IF(X%?y%)<>0OR(X%?(y%+320))<>0ENDP
ROC
  890 !&70=X%:!&72=E%:?&76=2:CALLcar%:X%
=X%+x%:!&70=X%:!&72=&5700:?&76=2:CALLcar
%
  900 ENDPROC
  910 DEFPROCbad
  920 IFf%=0W%=32+((RND(2)-1)*16):w%=RND
(4)-1:R%=Q%+W%+(N%*32):!&70=R%:!&72=Z%(w
%)+&10:?&76=1:CALLcar%:f%=1:ENDPROC
  930 IFf%=1!&70=R%-320:!&72=Z%(w%):?&76
=1:CALLcar%:f%=0:g%=1
  940 ENDPROC
  950 DEFPROCcrash
  960 wipe%=X%-640
  970 IFX%-640<&5800wipe%=wipe%+&2800
  980 IFX%?-320=24fmc%=(fmc%+1)MOD4:IFfm
c%=0L%=L%+1:SOUND2,1,200,1:COLOUR129:COL
OUR2:PRINTTAB(1,24);L%TAB(18,24);L%:COLO
UR128
  990 IFX%?-320=24SOUND1,4,167,1:!&70=wi
pe%:!&72=blank%:?&76=1:CALLcar%:E%=&5740
:die%=0:TIME=0:ENDPROC
 1000 IFX%?-320=254ORX%?-312=254SOUND1,-
13,90,1:sk%=1:sc%=0:!&70=wipe%:!&72=blan
k%:?&76=1:CALLcar%:ENDPROC
 1010 *FX15
 1020 t%=TIME
 1030 SOUND0,1,3,1:SOUND1,0,160,1
 1040 IFX%+320>&8000!&70=X%-&26C0:!&72=b
lank%:?&76=1:CALLcar%:X%=X%-320:!&70=X%:
!&72=&5700:?&76=2:CALLcar%
 1050 PROCexplode
 1060 IFL%=0ENDPROC
 1070 sk%=0:sc%=0:oldE%=E%:E%=&5740:REPE
ATPROCkeys:FORT=1TO130:NEXT:UNTILINKEY-9
9:E%=oldE%:TIME=t%:ENDPROC
 1080 DEFPROCexplode
 1090 FORJ=1TO4
 1100 FORI=&5640TO&5680STEP&20
 1110 !&70=X%:!&72=I:?&76=2:CALLcar%
 1120 FORT=1TO150:NEXT
 1130 NEXT
 1140 NEXT
 1150 !&70=X%:!&72=&56A0:?&76=2:CALLcar%
 1160 L%=L%-1:IFL%=0die%=1
 1170 COLOUR129:COLOUR2:PRINTTAB(1,24);L
%TAB(18,24);L%
 1180 COLOUR128
 1190 COLOUR2:COLOUR139:PRINTTAB(2,30)"S
CORE=";S%:COLOUR128
 1200 ENDPROC
 1210 DEFPROCskid
 1220 SOUND2,2,90,1
 1230 sc%=sc%+1:IFsc%=10sk%=0:sc%=0:ENDP
ROC
 1240 o%=RND(2)
 1250 IFo%=1PROCM(-8,-8)
 1260 IFo%=2PROCM(8,16)
 1270 ENDPROC
 1280 DEFPROCcrash2
 1290 IFX%?&26C0=24SOUND1,4,167,1:!&70=X
%+&2580:!&72=blank%:?&76=2:CALLcar%:E%=&
5740:die%=0:TIME=0:ENDPROC
 1300 IFX%?&26C0=254ORX%?&26B8=254SOUND1
,-13,90,1:sk%=1:sc%=0:!&70=X%+&2580:!&72
=blank%:?&76=1:CALLcar%:ENDPROC
 1310 ENDPROC
 1320 DEFPROCrestore
 1330 SOUND1,1,111,1:SOUND2,1,114,1:L%=L
%+1:COLOUR129:COLOUR2:PRINTTAB(1,24);L%T
AB(18,24);L%:COLOUR128
 1340 RESTOREcol%
 1350 READa%,b%,c%
 1360 FORI%=1TO3:READa%:VDU19,I%,a%;0;:N
EXT
 1370 col%=col%+10:IFcol%=1760col%=1740
 1380 RESTORE1400:READN%
 1390 ENDPROC
 1400 DATA120,120,120,120,120,120,120,19
3,120,120,120,120,120,120,120,120,120,12
0,120,120,120,120,120,120,120,120,70,2,2
,2,2,189,189,189,189,173,174,173,174,173
,174,173,174
 1410 DATA189,189,189,189,2,2,2,2,74,78,
22,119,127,128,119,119,149,150,18,26,94,
38,4,4,4,4,4,4,191,191,191,191,179,180,1
79,180,179,180,179,180,179,180,179,180
 1420 DATA191,191,191,181,182,181,182,18
1,182,181,182,181,182,181,182,58,62,66,1
33,134,70,2,2,26,94,106,70,26,30,3,3,3,3
,3,3,3,3,3,3,3,3,3,3,3,3,34,38,42,46,5,5
 1430 DATA5,5,5,50,122,122,122,141,142,1
22,122,46,5,5,5,5,5,5,50,102,106,110,114
,118,123,124,118,118,118,118,118,118,118
,86,10,118,143,144,118,118,118
 1440 DATA145,146,86,0,0,10,6,82,86,0,0,
0,0,0,0,0,0,0,0,0,0,10,14,90,30,66,110,1
19,119,127,128,119,119,119,129,130,90,15
1,152,120,120,70,171,172,189,189,189
 1450 DATA173,174,189,189,189,171,172,18
9,189,189,26,151,152,120,120,153,154,153
,154,120,30,190,190,190,190,190,175,176,
175,176,190,190,190,190,190,190
 1460 DATA66,120,153,154,120,120,30,3,3,
3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,
3,3,3,3,3,3,3,3,190,190,190,190,190,177,
178,177,178,177,178,177,178,177,178,177,
178,177,178,177,178,177,178,177,178
 1470 DATA34,121,121,121,121
 1480 DATA155,156,121,121,121,121,106,13
3,134,94,38,4,4,4,4,42,46,5,5,5,5,192,19
2,192,192,192,192,183,184,50,122,122,161
,162,161,162,161,162,161,162,161,162,161
,162,161,162,161,162,122,122,122,159,160
,159,160,159,160,122,122,122
 1490 DATA161,162,161,162,161,162,46,192
,183,184,183,184,183,184,192,192,192,5,5
,5,5,5,5,5,5,5,5,5,5,5,5,50,54,58,62,66,
70,74,129,130,127,128,114,14,90,30,175,1
76,66,30,177,178,66,30,175,176,66,30,177
,178,66,30,175,176,66,30,177,178,66,30
```

```
 1500 DATA175,176,66,30,177,178,66,151,1
52,151,152,151,152,120,120,153,154,153,1
54,153,154,120,120,120,120,120,120,133,1
34,120,120,120,120,120,120,120,120,120,1
20,120,120,131,132,94,106,70,189,189,171
,172
 1510 DATA189,189,189,2,2,189,189,189,2,
2,2,2,2,189,189,189,189,189,2,2,189,2,18
9,189,189,189,189,189,2,2,2,189,189,189,
189,171,172,189,189,189,189,2
 1520 DATA189,189,74,78,188,188,188,188,
188,188,188,188,188,188,188,188,188,188,
188,188,188,188,188,188,188,188,82,86,10
,6,188,188,188,188,82,118,145,146,118,11
8,118,118,118,123,124,14,119,119,90
 1530 DATA30,190,190,190,190,3,3,3,3,34,
38,179,180,179,180,179,180,42,46,192,192
,185,186,185,186,192,192,50,54,42,46,50,
46,183,184,50,46,185,186,50,46,185,186,5
0,46,185,186,50,46,183,184,50,46,185,186
,50,102,106,120,120,120,120
 1540 DATA133,134,120,120,110,78,167,168
,167,168,167,168,167,168,167,168,167,168
,167,168,167,168,22,149,150,149,150,147,
148,119,119,119,119,119,119,119,119,119,
119,114,86,187,187,187,187,0,0,0,0,0,0,0
,0,0,0
 1550 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,10,118
,118,118,118,123,124,118,118,118
 1560 DATA6,188,188,167,168,167,168,188,
188,188,188,1,1,1,1,1,1,1,1,1,1,1,1,1,1,
1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,
1,1,1,1,1,1,1,1,1,82,118,118,125,126,118
,118,118,118,14,90,94,38
 1570 DATA191,191,42,122,122,46,5,5,5,5,
5,5,5,5,5,5,5,5,5,5,5,50,54,58,62,66,195
,196,197,198,221,222,223,224,201,202,201
,202,200,200,200,203,204,203,204,203,204
,205,206,200,200,207,208,200,200,200,200
,200,200,200,200,200,200,200
 1580 DATA209,210,200,200,200,200,211,21
2,200,200,200,213,214,215,216,217,218,21
9,220,195,196,197,198,221,222,223,224,20
1,202,203,204,213,214,215,216,217,218,21
9,220
 1590 DATA94,98,122,122,159,160,159,160,
```

➤



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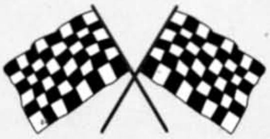
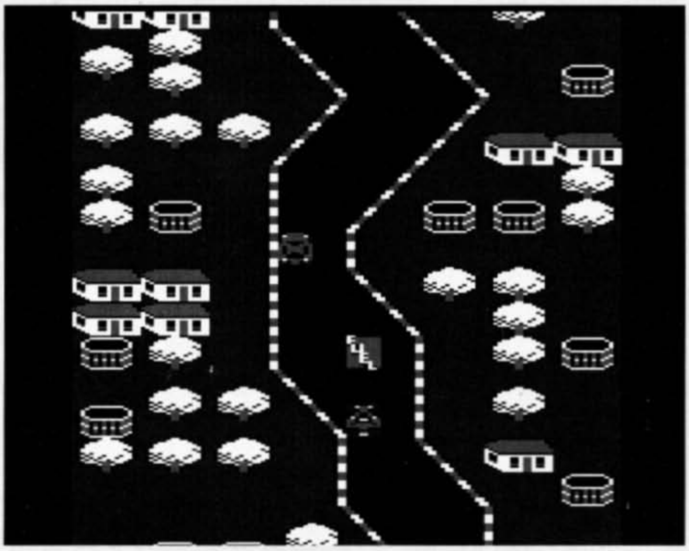


➤

```
159,160
 1600 DATA141,142,122,122,122,122,122,12
2,122,159,160,161,162,122,122,122,122,12
2,122,122,122,122,122,122,122,54
 1610 DATA42,46,5,5,5,5,5,5,5,5,5,5,5,5,
5,5,5,5,192,192,192,192,50,159,160,159,1
60,159,160,159,160,159,160,159,160,159,1
60,159,160
 1620 DATA122,122,122,161,162,102,106,30
,34
 1630 DATA155,156,155,156,121,121,121,12
1,121,121,121,121,121,121,121,121,121,13
7,138,121,121,135,136,121,121,121,121,12
1,121,121,157,158,121,121,121,121,121
 1640 DATA106,151,152,151,152,151,152,70
,74,78,188,188,188,188,188,1,1,1,1,1,1,1
88,188,188,188,22,149,150,149,150,149,15
0,18,189,189,171,172,171,172,74,78,22,90
,94,62,66,70,26,30,175,176,175,176,34,12
1,121,121,121,137,138,121,121,121
 1650 DATA135,136,121,121,155,156,121,62
,175,176,175,176,190,190,190,190,190,190
,190,190,3,3,3,3,3,3,3,3,190,190,190,190
,190,190,66,110,90,195,196,197,198,221,2
22,223,224,209,210,211,212,213,214,215,2
16,217,218,219,220,195,196,197,198
 1660 DATA221,222,223,224,201,202,203,20
4,213,214,215,216,217,218,219,220,70,189
,189,2,2,2,2,2,189,189,189,189,189,173,1
74,189,189,189,2,2,2,2,189,189,189,189,7
4,119,119,119,119,119,119,129,130,119,11
9,119,119,119
 1670 DATA149,150,149,150,119,119,119,11
9,147,148,119,119,119,119,78,22,78,22,18
,74,18,74,78,22,78,22,18,74,18,74,114,86
,187,187,187,187,163,164,163,164,163,164
,163,164,163,164,163,164,187,187,187
 1680 DATA165,166,165,166,165,166,165,16
6,165,166,165,166,10,123,124,145,146,145
,146,118,6,188,188,188,167,168,188,188,1
88,169,170,169,170,188,188,188,167,168,1
67,168,188,188,188,169,170,169,170,188,1
88,188,167,168,167,168,188,188,188
 1690 DATA22,90,94,98,102,106,110,114,11
8,118,118,143,144,14,90,195,196,197,198,
217,218,219,220,151,152,153,154,195,196,
197,198,217,218,219,220,153,154,195,196,
197,198,217,218,219,220,151,152,151,152,
153,154
 1700 DATA195,196,197,198,217,218,219,22
0,120,120,195,196,197,198,221,222,223,22
4
 1710 DATA200,200,200,200,205,206,200,20
0,200,200,201,202,200,200,207,208,200,20
0,200,209,210,209,210,200,200,213,214,21
5,216,217,218,219,220,195,196,197,198,22
1,222,223,224
 1720 DATA213,214,215,216,217,218,219,22
0
 1730 DATA-1
 1740 DATA4,2,5
 1750 DATA3,4,1
 1760 DATA5,3,4
 1770 DEFPROChst
 1780 GOSUB1880
 1790 PRINT'SPC8"Your score was ";S%
 1800 I%=-1:REPEAT:I%=I%+1:UNTILS%>HS%(I
%)ORI%=8:IFI%=8GOTO1850
 1810 FORJ%=7TOI%+1STEP-1:HS%(J%)=HS%(J%
-1):HS$(J%)=HS$(J%-1):NEXT:HS%(I%)=S%
 1820 INPUT'"Enter name "N$
 1830 HS$(I%)=LEFT$(N$,8)
 1840 GOSUB1880
 1850 *FX15
 1860 PRINT'"  Press SPACE to play again
...";:REPEATUNTILGET=32
 1870 ENDPROC
 1880 CLS:FORI=1TO2:PRINTTAB(11,I)CHR$14
1CHR$(130+I);hst$:NEXT:FORI%=0TO7:PRINTT
AB(6,I%*2+4)CHR$141CHR$129;HS$(I%)TAB(28
-(LENSTR$(HS%(I%))),I%*2+4);HS%(I%):PRIN
TTAB(6,I%*2+5)CHR$141CHR$131HS$(I%)TAB(2
8-(LENSTR$(HS%(I%))),I%*2+5);HS%(I%)
 1890 NEXT:RETURN
```



Get it right ✓

```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 =   11 1
  50 = 2CAE 0
  60 = CDF3 D
  70 = 5AC4 0
  80 =  FDE A
  90 = 366A 1
 100 =  28A 6
 110 = BFBA 3
 120 = AACF B
 130 =  95F 9
 140 = 752A 0
 150 = 3C4A B
 160 = DEBB D
 170 = 9D5F 9
 180 = BFBA 8
 190 = DCA9 4
 200 = B0B6 0
 210 = 1637 4
 220 = EABA 4
 230 = 9AB6 8
 240 = 93BA A
 250 = 5ADF 8
 260 = A022 F
 270 = 5B81 9
 280 = A76B 0
 290 = DDB7 E
 300 = 25B3 0
 310 = 53CE F
 320 = FD2E 3
 330 = 344C 9
 340 =   FD E
 350 = DE9D 5
 360 = C64B 0
 370 = 3961 F
 380 = E4C0 A
 390 = C331 0
 400 = 33B9 D
 410 = C04F D
 420 = 70EB E
 430 = 78BB 0
 440 = ED0F 6
 450 = 363B 4
 460 = 5A86 4
 470 = 2522 E
 480 = 225A C
 490 = 58AE C
 500 = 56E7 9
 510 = 87B1 A
 520 = B8CB 2
 530 = 3DBA 4
 540 = 71E2 C
 550 = AEFD E
 560 = 525C 3
 570 = A76B A
 580 = 5B81 8
 590 = 173E B
 600 = ED0F 7
 610 = FB6C E
 620 = 6CC6 C
 630 = 54DC F
 640 = CBA1 A
 650 = 5C02 0
 660 = 8240 8
 670 = 2A61 8
 680 = 9009 8
 690 = C210 4
 700 = 6867 F
 710 = 3DBA F
 720 = F635 F
 730 = 969E 7
 740 = ED0F A
 750 = 687B E
 760 = 8763 0
 770 = AACA 4
 780 = 8D1D 3
 790 = A8EA A
 800 = ED0F 5
 810 = 5A41 8
 820 = 36DC 8
 830 = D2EE 4
 840 = 7FE3 8
 850 = 6C27 6
 860 = ED0F 8
 870 = 14E2 7
 880 = F7BC C
 890 = 1A94 B
 900 = ED0F E
 910 = 858F 4
 920 = CD2B D
 930 = BDAE E
 940 = ED0F 5
 950 = F574 6
 960 = 1850 3
 970 = DC78 9
 980 = A3F0 7
 990 = CF75 4
1000 = 1F04 D
1010 = A022 1
1020 =  5E3 4
1030 = DAE1 3
1040 = E41D 1
1050 =  799 4
1060 = 3D5F 1
1070 = 6196 F
1080 = EA3F D
1090 = 1497 7
1100 = CCA2 2
1110 = 1FE1 3
1120 = BCF5 B
1130 = 2C83 9
1140 = 2C83 B
1150 = C2F5 4
1160 = 12F7 0
1170 = 525C C
1180 = A76B 7
1190 = 6E3B 4
1200 = ED0F 3
1210 = BE81 6
1220 = 820C 8
1230 = 7A74 0
1240 = F1B8 1
1250 = 2E0F D
1260 = CF77 B
1270 = ED0F C
1280 = DDAB 7
1290 = 1389 B
1300 = 7B74 C
1310 = ED0F F
1320 = 49A4 6
1330 = 173E C
1340 = 1756 E
1350 = D5B1 A
1360 = 2CD1 6
1370 = 6DAA D
1380 = CCA8 F
1390 = ED0F 9
1400 = 36A7 B
1410 =  684 E
1420 = 8A5C 1
1430 = B47A 2
1440 = 98E7 C
1450 = 8A4B 9
1460 = DDA5 B
1470 = D1B2 6
1480 = 30DD F
1490 = C420 F
1500 = 5945 8
1510 = 4D03 8
1520 = 6AD2 C
1530 = 1436 5
1540 = ED5F D
1550 = C790 E
1560 = DFCB 8
1570 = 742D A
1580 = 3337 A
1590 =  903 5
1600 = 48D7 4
1610 = C017 7
1620 = E8F3 C
1630 = 3A7E 0
1640 = D381 9
1650 = 3CAF F
1660 = 2342 C
1670 = B913 8
1680 = 2643 D
1690 = 9FD4 B
1700 =  ADF 9
1710 = E88D 8
1720 = 3F43 5
1730 = 463D 5
1740 = DC7B 8
1750 = 498B B
1760 = 513B 8
1770 = 356E 6
1780 = 28EC A
1790 = 9539 E
1800 = 3BA4 8
1810 = 3299 4
1820 = 7D57 C
1830 = 69C8 1
1840 = 28EC 1
1850 = A022 3
1860 = C219 F
1870 = ED0F B
1880 = F302 0
1890 = 6629 6
```

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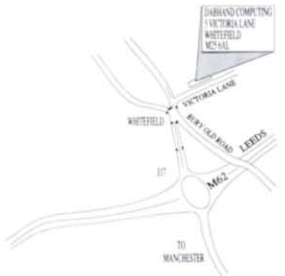

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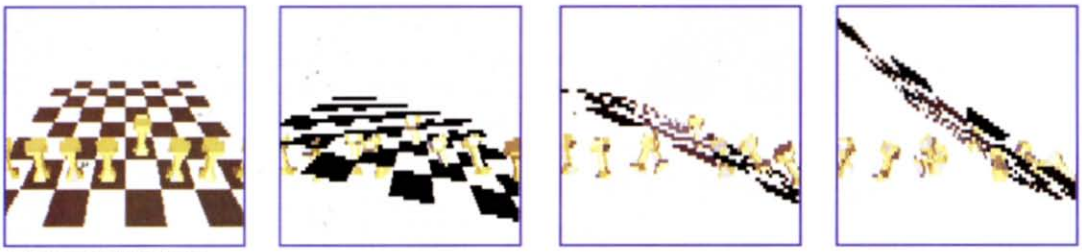


A sequence of !Splice frames

!Splice

Price: £30
Supplier: Ace Computing, 27 Victoria Road, Cambridge CB4 3BW.
Tel: 0223 322559

ACE Computing has again added to its !Euclid suite, this time with !Splice, an application to edit and join films. It also lets you build them by hand using individual sprites.

The package comprises one disc and an A5 user guide with the usual tutorial. This takes you step-by-step through the process of editing existing films, creating a new hand-drawn film and joining two films together.

The instructions are well laid out and easy to follow. However, you really need at least 2Mb of ram if you want to use !Splice, !Paint and !Projector at once.

!Splice is fully multi-tasking and easy to handle. Double-clicking on the icon reveals a pair of scissors which then sit on the icon bar in the usual way.

The films to work on are in the Sources directory, while Results contains the modified films – so you can check if your efforts match. Ace also provide the latest – multiple film – release of Projector.

While you are editing a film, !Splice shows all the frames in a window called the film viewer. Numbered in sequence, the frames – as sprites – can be moved to !Paint and altered and re-inserted.

Adding ingredients

MULTI-TASKING utilities and applications continue to appear for the Archimedes series and BBC A3000 in an apparently unending stream. And one reason for this is the effortless way in which new extensions can be incorporated into the existing structure. Here are three more that will make your 32 bit micro easier to use and more powerful.

Terry Blunt examines an array of utilities and expansions which have come his way

DiscTree

Price: £49.95
Supplier: Mitre Software, 26 Creechurch Lane, London EC3A 5BA.
Tel: 071-283 4646

DiscTree is basically a disc management application, intended to assist you to keep track of your files and to maintain backups in a convenient form.

I decided to test the program's use of accepted DeskTop practice by seeing how far I could get without referring to the comprehensive and detailed manual. It is to Mitre's credit that I had no difficulty handling any of the features, with windows and menus appearing as expected.

Double-clicking on the DiscTree icon – a psychedelic tree – will put the application on the icon bar. Clicking on menu over this icon gives you a choice of drives to analyse, and from here you can select new devices you wish to analyse.

Analysing a disc is carried out in full multi-tasking mode as this can take some time for a large, complex directory structure. You are warned, however, not to perform any tasks that would alter directories, such as saving new files, deleting or renaming.

Once a disc has been analysed, a window is opened to show the disc's entire tree structure. This is done using the normal filer icons with indents and bent arrows indicating the branches of the tree – unsurprisingly this is called a tree viewer.

You can look into any of these directory branches with the normal filer operations, but again Mitre warns against directory or file changes without opening a new viewer.

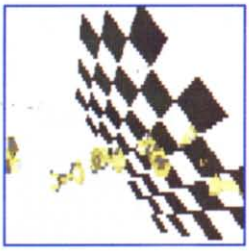
The search feature is quite sophisticated and will allow for all directories, selected groups of directories, file wildcards and even file type groupings.

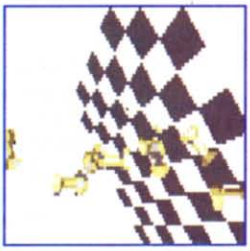
Although you can open several tree viewer windows from different discs and start at different directories, you can't search over all the open windows. Each tree viewer is completely self-contained, which is a pity.

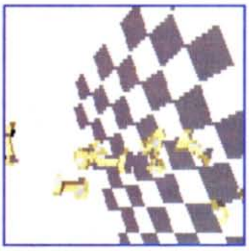
The backup facility allows an entire disc or just groups of directories to be handled, and a single file is created in the backup disc with a *safe* icon. If you are backing up to lower capacity discs, such as from hard to floppies, you are prompted for the fresh discs.

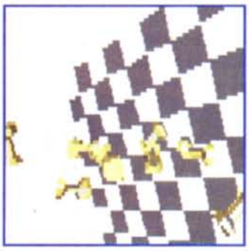
Backup script files can be created that store all the options used on a specific

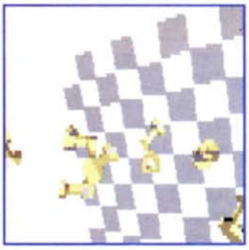
➤











Alternatively you can remove frames or create new blank ones and drop your own into them.

You select frames in the usual manner using Select or Adjust on the mouse. These can then be flipped vertically or horizontally, re-sized and re-scaled or you can change the natural screen mode – all Ace films run faster in their natural mode though.

There is also a facility to print individual frames using the Risc OS drivers. You can have a landscape or portrait print with re-scaling and positioning on the paper as needed.

In a long film it's possible to select groups of frames to edit. This is done using Steps and Clusters and changing the start and end points. Steps enables you to take, for example, every sixth frame.

If you specify a cluster size of two you'll see the first two in every six frames. Then, if you want, start from frame 18 and finish at frame 60.

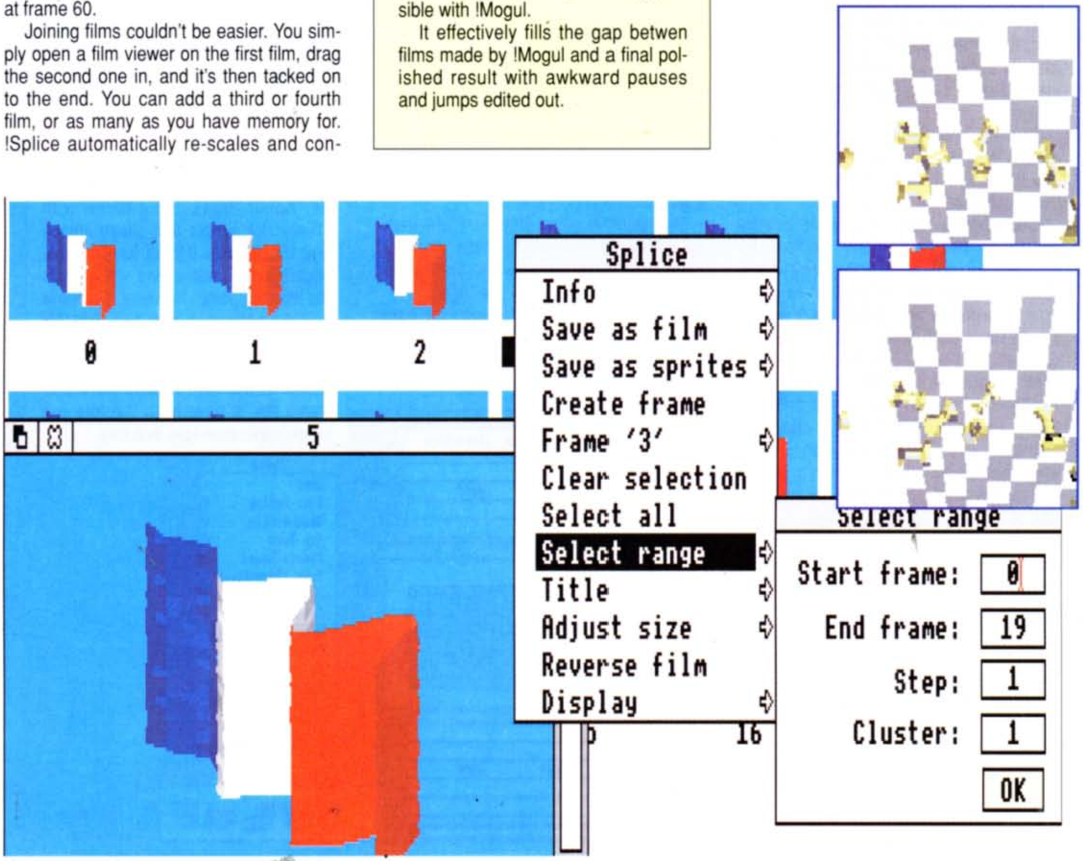
Joining films couldn't be easier. You simply open a film viewer on the first film, drag the second one in, and it's then tacked on to the end. You can add a third or fourth film, or as many as you have memory for. !Splice automatically re-scales and converts the additional films if necessary. However, !Splice is not able to run the edited film itself, so you need to use a projector on a finished, saved film. I would have liked to have been able to slow scan the frames in the area where you have been working before committing the whole to file.

Although part of the !Euclid suite, !Splice can stand alone and, apart from the public domain application !Projector to display your films, you don't need any of the other parts of the group.

Summing up

!Splice is a worthwhile and relatively inexpensive addition to the !Euclid range. It enables far longer films to be built up than was previously possible with !Mogul.

It effectively fills the gap betwen films made by !Mogul and a final polished result with awkward pauses and jumps edited out.



Start frame: 0

End frame: 19

Step: 1

Cluster: 1

Preparing the flag demo with !Splice

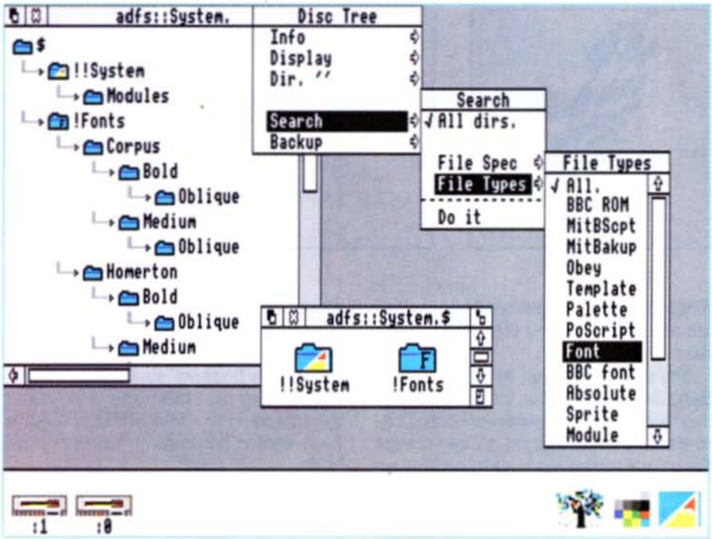
backup operation – making for easy repetition. The nice-looking icon for these depicts an open safe with a piece of paper peeking from it.

Like other operations, Restore permits general restoration or specific files and directories. Extra features are supplied like copy-if-newer and dragging the file icons to completely new directories and discs.

Both Backup and Restore can be slow, and It would have been preferable if they had worked in the background. Perhaps Mitre considered that these functions would be too prone to corruption if another task wrote to the disc.

Summing up

DiscTree is a well thought out piece of software. Despite the lack of background backup or multi-disc searches. It is especially useful, and I would recommend it, if you have a hard disc.


adfs::System.
$
!!System
Modules
!Fonts
Corpus
Bold
Oblique
Medium
Oblique
Homerton
Bold
Oblique
Medium
Disc Tree
Info
Display
Dir. ''
Search
Backup
Search
√ All dirs.
File Spec
File Types
Do it
File Types
√ All.
BBC ROM
MitBScpt
MitBakup
Obey
Template
Palette
PoScript
Font
BBC font
Absolute
Sprite
Module
adfs::System.$
!!System
!Fonts
:1
:0

Using !DiscTree

!Tween

Price: £30
Supplier: Ace Computing, 27 Victoria Road, Cambridge CB4 3BW.
Tel: 0223 322559

!TWEEN is a !Euclid suite addition, producing films from 2D !Draw files, whereas !Mogul enabled you to make films of 3D objects and !Splice uses sprites and existing films. Containing a disc and guide, there is also a step-by-step tutorial with a screen dump to help to explain !Tween's workings.

Again it is fully multi-tasking with considerable example and tutorial material on the disc. But unlike !Splice, !Tween is a complicated package and makes considerable use of the various different directories and file types.

To use !Tween you set up key frames, as with !Mogul. Here though, you manipulate the draw files, starting by clicking the menu button on the !Tween icon.

Choosing the New Action route exhibits an icon similar to a ringbound notepad. By dragging this to any directory viewer you create an action file and a !Camera directory. A window will then open with a spreadsheet style layout – the dope window, which is similar to the paper layout used by conventional animators.

The dope window at first has only one toon – any object recognised as part of an animation – this is the compulsory camera which defines the view of all other objects and can be used later to alter the apparent size of the objects in the final film.

Toons appear as named entries across the dope window and as an open directory viewer within the one to which you initially dragged the action file.

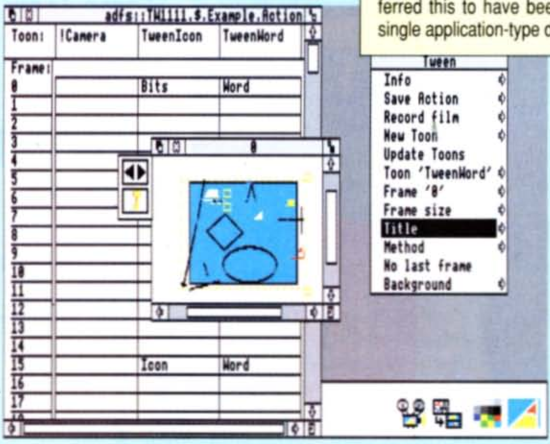
Following the instructions, you add toons to the dope window. Each can be a single drawfile or a set of linked files that metamorphose from one to the other.

It's very important that you ensure that the drawfiles you want to link contain exactly the same type of objects, created in the same order and with the same number of points. Otherwise !Tween will mark them with a question mark and refuse to handle the frame. !Tween would have to be even more sophisticated to deal with these inconsistencies.

The first example in the tutorial involves modifying an existing film, while the second creates a completely new one. I found the second example easier to follow, as I could see the toon directories and their entries in the dope window build up one at a time.

Animation is easy. There are 250 vertical numbered frames in the dope window – quite enough for the average film length, and if not you can always use !Splice.

You select your key frames for each toon by clicking on the frames/draw files you want. Repeated clicking will run through all the frames that can be used.


adfs::TWilli.$.Example.Action
Toon:
!Camera
TweenIcon
TweenWord
Frame:
0
Bits
Word
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Icon
Word
16
17
0
Tween
Info
Save Action
Record film
New Toon
Update Toons
Toon 'TweenWord'
Frame '0'
Frame size
Title
Method
No last frame
Background

The dope window

This is used for the metamorphosing toons and also so that you can scale and rotate objects in the same way as you can in !Draw. !Tween also incorporates frame copy and background colour changes.

Each toon can only be altered on frames selected as key frames. All the intervening frames will be interpolated by !Tween when the final film is created. You can also alter the drawing order of the toons, so that small objects are hidden by larger ones.

Summing up

I would envisage anyone with the earlier Applications using !Draw with !Tween for simple film constructions and !Euclid with !Mogul for the more sophisticated animations – !Splice is the meeting point. However, !Tween is a useful application in its own right. My only concern is the use of exposed directories to store the construction elements of the film. I would have preferred this to have been invisible in a single application-type directory.

Getting Inter-Word under control

£10 *Prize letter*

THIS short routine will program the function keys 0, 4, 5, 6 and 7 for use within Inter-Word, when pressed with Control+Shift as follows:

- ***f0*** *Prints the date – obtained from the Master's clock – in the form 27 September 1990.*
- ***f4*** *Underlines the word just typed by moving the cursor back one space, marking the word, underlining it and then moving the cursor forward one space.*
- ***f5*** *Emboldens the word just typed by the same method.*
- ***f6*** *Dotted underlines the word just typed by the sme mehtod.*
- ***f7*** *Normalises the word just typed by the same method*

Keys 4,5,6 and 7 are chosen because they are the ones that perform the standard functions – with Shift – format the normal Inter-Word features.

```
 10 d$=MID$(TIME$,5,3)
 20 M$=MID$(TIME$,8,3)
 30 Y$=MID$(TIME$,11,5)
 40 REPEAT
 50 READ month$
 60 UNTIL m$=LEFT$(month$,3)
 70 p$=d$+month$+y$
 80 OSCLI("KEY0 "+p$)
 90 DATA January, February,
March, April, May, June,
July, August, September,
October, November, December
100 *KEY4|!,|Z|!|D|!-
110 *KEY5|!,|Z|!|E|!-
120 *KEY6|!,/z|!|G|!-
140 *IW.
```

The above routine takes the Master's shortened version of the month and expands it to its proper state, for example: Sep becomes September. If you are not worried about the month being printed in full then the routine can be further simplified as shown below:

```
10 OSCLI("KEY0
"+MID$(TIME$,5,11))
20 *KEY4|!,|Z|!|D|!-
30 *KEY5|!,|Z|!|E|!-
40 *KEY6|!,|Z|!|F|!-
50 *KEY7|!,|!|!|G|!-
60 *IW.
```

*Whichever routine you use, save it as Keys and then *BUILD !BOOT with two lines:*

```
1 *FX15
2 CHAIN"Keys"
```

*Then set the disc to execute the !Boot file with *OPT4 3.* – **R. G. Sharman, Lieutenant Command, Royal Navy, Northwood.**

Landscaping with ease

AFTER reading the letter from Mark Holton, in the May issue, I thought that an 8 bit version of the Zarch landscape program would be easy to create so I typed in the program and ran it to find where to make any changes to it.

To my surprise the program ran perfectly and just as quickly. I hope this clears up any confusion. – **Mark Walters, West Deeping, Peterborough.**

Reporting the facts, man

I WOULD like your help with the command on the BBC B that states whether my machine is Basic I or II, I can remember seeing it mentioned in The Micro User *perhaps in one of the "Micro Memories" boxes and meant to make a note of it.*

I have been through all my issues but cannot find it and there's no reference to it in the BBC User Manual. Thank you for a first class magazine and all your help in the past and, hopefully, now. – **Harold T. Lunson, Brighton, E. Sussex.**

● Nothing simpler: Press Break and type REPORT. The last digit of the year number is the version of Basic – this applies to all the 8 bit micros but not the Archimedes which is BBC Basic V.

Win a tenner

WANT to write to The Micro User? The addess is: Letters, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield, SK10 4NP.

Writers of the most interesting letters receive a £10 prize.

Faster than that...

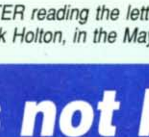
The short piece about FILM-Maker in the June issue stated that it could only animate at a frame per second. In fact it can produce stand-alone animations that play back at high speed without flickering. – **Y. Nadiadi, Silicon Vision, Signal House, Lyon Road, Harrow, Middx HA1 2AG.**

Emulator disc error

I WAS very interested in the letter about configuring a 40 track MS-Dos disc for the PC Emulator. I made the changes – after making a backup of my CONFIG file called CONFIG.BAK – but they didn't

➤

Bouncers not bouncing?



I RECENTLY bought a BBC A3000 and to familiarise myself with the machine, I have been typing in programs from past issues of The Micro User.

However, I have tried the Bouncers program from January 1989 but unfortunately, it will not run until I reduce the number of screens to two when the effect of the program is lost.

Is there any simple modification that can be made to the program to enable it to run on the A3000? – **M. E. Parkinson, Walsall, West Midlands.**

● The problem isn't with the program but with the improvements to the operating system – Risc OS always reduces the screen memory allocated to the minimum for the current screen.

The solution is to increase the allocated memory space to some very large number – in fact everything you can spare – immediately before running the program.

Sorting out the resets

THERE are three types of reset on the 8 bit BBC Micros – a soft reset which occurs on pressing the Break key, a hard reset on Control+Break and a power-on reset which occurs at switch on. The value of memory location &28D identifies the type of reset last performed – one for power on, zero for soft and two for a hard reset.

It is possible to perform some of these resets in software without actually pressing the keys or switching on:

	Basic	Machine Code
Soft reset	CALL!-4	JMP(&FFFC)
Hard reset	?	?
Power-on reset	*FX151,78,127 CALL!-4	LDX#151 LDX#78 LDY#127 JSR&FFF4 JMP(&FFFC)

Can anyone show how to perform a software hard reset? – D. Symmons, Hollywood, Birmingham.

● Well, we don't know how to do it – any takers, or perhaps an explanation as to wy it can't be done?

➤

seem to work properly, Was there an error? – **Keith Roberts, Horley, Sussex.**

● The device definition line did have an error, it should have been:

```
DEVICE=DRIVER.SYS /D:2 /T:40
/S:9 /H:2 /F:0
```

I hope this sorts out your difficulty.

Upgrade from Greece

FIRSTLY, congratulations to all of you for the magazine you send us here. It's one of the few kinds of help we have when we use our Beeb since there's no authorised dealer of the machine in our town.

Continuing, I want to apologise for any bad use of the language but unfortunately I can't make the best out of it.

I found your Address Book in the August 1987 issue very useful. It can be used in many different applications. I, personally, use it as a note pad and telephone book – as the original version suggests – as a cook book and in order to keep a file with the indexes of the magazines I buy.

However, I was a little bit disappointed by the find option that the program has. It presupposes that you know the field in which the element you want to find is. I have made a few additions and allocations in Listing II of the original in order to make it possible to find a string which is in any field. These changes are:

```
170 IF A=148 AND nz>0 fl%=0:P
ROCfind ELSEIF A=149 PRCupd
205 IF A=156 THEN fl%=1:PROC
find
220 UNTIL A=27 OR (A>147 AND
A<152) OR (A>152) OR (A>152 A
ND A<157)
360 z=0
375 IF (b>1 AND fl%=0) THEN F
ORX%=1 TO b-1:st=st+l(x%)+2:N
EXT
383 IF fl%=0 THEN GOTO 407
385 srch%=0:REPEAT srch%=srch
%+1:IF srch%>1 THEN st=st+l(s
rch%)+2
370 REPEAT:REPEAT r=r+1:st=5
405 UNTILsrch%=N or f
407 IF fl%=0 THEN PTR#X=FNptr
+st:INPUT#X,s$:IF INSTR(s$,t$
)>0 f=TRUE
465 fl%=0
925 PRINTTAB(1,26);FNf;" find
 through all fields    "
1060 REPEAT B=GET:UNTIL B=13
OR B=27 OR (B>31 AND B<128) O
R (B>134 AND B<140) OR (B>147
 AND B<157)
```

Now you can type a string in any field you like and press f8. The program will search every field in every record to find a string that matches to the given one. However this option will become slower as much more comparisons are to be done. So I left f0 to do the original search – in one specific field of each record.

This advanced find option is easy to be added to the two select options – f6 and f7 keys. – **Costas-Lawrence Buhayaz, Thessaloniki, Greece.**

● Thanks for the upgrade – it's good to see the old BBC Micro is found in all parts of the world.

No problem with ERRors

IN the April 1989 issue of The Micro User *Colin Johnson wanted to be able to set the values of ERR and ERL to whatever he liked. The way that you are supposed to do this is to execute a BRK instruction (in machine code) followed by the error number and an error message.*

To activate this, you CALL the location of the break instruction, the error messge will be printed and if you type PRINT ERR the error number will be displayed. There is a problem with this in that ERL cannot be set and it interrupts the flow of the program.

To overcome this, I had to find where the values of ERR and ERL are stored.

My trusty Advanced User Guide came to hand and informed me that for ERR the value has to be placed in a memory location of your choice and then it has to be pointed to by the pointer in locatios &FD and &FE.

So, for example if you wish to create ERR=99 the following would do:

```
?&70=99
?&FD=&70
?&FE=0
```

ERL is stored in two memory locations, &8 and &9. If N% is the line number:

```
?&8=N%MOD256
?&9=N%DIV256
```

Finally, does anyone know where I can get spares for an Acorn Atom please? – **Chris Cowdery, Reading, Berks.**

● We still don't know why anyone would want to set ERR and ERL, it looks like a solution looking for a problem. Any offers on the Atom spares?

Interesting effects

IN the March 1990 issue a reader asked how he could get a steady cursor in his B+. The solution given was a short machine code routine, but there is a far simpler way:

```
VDU 23,0,10,18,0;0;0;
```

However, this only works in mode 7 but it is easy to produce this and many more effects in all modes.

Imagine a variable X which is set to zero. IF you want the cursor to flash, add 64 to X. If a steady cursor is required, don't add anything.

If you want a slow flash rate, add 32 to X, for a fast flash don't add anything. Note that if you have chosen a steady cursor, an attempt to set a slow flash rate will turn the cursor off.

The cursor is built up from a number of scan-lines. The maximum number of scan-

Public domain welcomed

The idea of including Public Domain software on the Archimedes/A3000 subscription disc is an excellent one and I hope you continue to do so. Some magazines have said that it would inevitably increase the cost of the disc but it obviously doesn't since you distribute the discs to subscribers anyway.

And as you'll only be putting out 12 discs a year you can hardly be accused of treading on the toes of the PD Libraries.

A quick final suggestion, I'd very much like to see a multi-tasking sound sequencer that uses the internal voices – any chance? – **Ian Ford, Burnage, Manchester.**

Teri Paul writes: Thanks for the compliments, we do our best to please – looks like we're succeeding. Hopefully we'll soon be able to put PD stuff on the 8 bit discs too. As for the sequencer – well, someone's got to write it first.

lines is 8 in Modes 0, 1, 2, 4 and 5, 10 in Modes 3 and 6, and 20 in Mode 7. So to change the size of the cursor, add the number of scan-lines you want to X. Note that for a full size cursor, add 0 and for the smallest cursor – which is in fact zero scan-lines deep – add the maximum for the mode you are working in.

Finally, enter the command

```
VDU 23;10,X,0;0;0;0;
```

For a special effect type:

```
 10 MODE 7
 20 REPEAT
 30 FOR P=0 TO 19
 40 VDU23;10,P,0;0;0;0;
 50 TIME=0:REPEAT UNTIL TIME=5
 60 NEXT
 70 FOR P=19 TO 0 STEP-1
 80 VDU 23;10,P,0;0;0;0;
 90 TIME=0:REPEAT UNTIL TIME=5
100 NEXT
110 UNTIL FALSE
```

If someone could put that into machine code under interrupts...

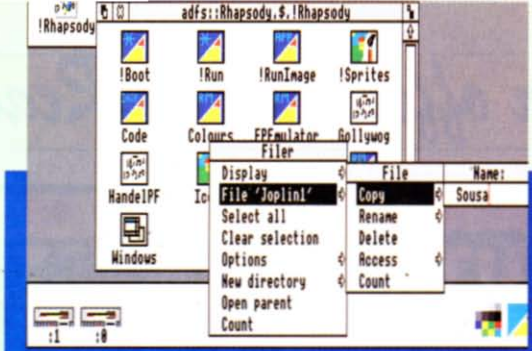
It is posible to program the 6845's other registers. Try typing:

```
VDU 23;4872;0;0;0;
```

in various modes or

```
VDU23;8,&90;0;0;0;23;9,&09;0;0
;0;
```

in Mode 7. Can anyone else produce weird effects from the CRTC chip? – **Matthew Bennion, Royton, Oldham.**



No room for !Rhapsody

I WAS very eager to try the demo of !Rhapsody on last month's Archimedes subscription disc however it generated an error message as I loaded it – although it would still work. I was disappointed to find I couldn't run anything else with it as it filled the whole of my 4Mb machine.

What's wrong with it? – **Jim Grainger, St. Helens, Lancs.**

● Due to space limitations we had to remove one of the 'hard-wired' sample tunes. But this causes the program to grab all the available memory.

To get around this copy the entire !Rhapsody application to another disc for security. Next, open it up by double-clicking its icon with Shift held down.

Locate one of the music files – Joplin1, HandelPF or Gollywog – and, using the Filer menu option, copy one of them with the new name *Sousa*, as shown in the picture.

You'll now find that no error message is generated and the program doesn't grab all available memory.

List error?

THANK you for publishing my Ram Board expansion in the July and August issues of The Micro User.

Unfortunately the listing in the second article belonged to the first and the listing that should have been there wasn't at all. Can something be done about it?

Also, if anyone is interested I can provide kits for the board for £35.19 or fully built and tested ones for £45.19 (foreign orders add £3). – **Rob** Anderson, 12 Fairy Dell, Marton, Middlesborough, Cleveland TS7 8LF.

● That is definitely an ooops on our part, the missing program is on this month's subscription disc.

Incidentally PMS, who used to supply a board similar to this, are about to release a whole bunch of utilities that will work with it into the 8 bit BBC Micro Public Domain so it's certainly worth building.

What about a cover disc?

WHY don't you put the price of the magazine up to £2.50 and include the monthly disc free on the cover like other magazines do? – **P.J. Rhodes, Chadwell Heath, Essex.**

● It would be very nice to be able to do that, and we have considered the possibility but unfortunately the question is: What format?

We could put 5.25in 40 track DFS on one side and 80 track on the other. But what about 3.5in discs and on which disc size? And many readers still use tape. Unfortunately the system we have – tape or disc supplied with subscription – is the best compromise we can get. At least it means that you get the format best suited to your machine.

Handy start up routine

I WOULD just like to publicise the routine which I use to initialise Inter-Word and Spell Master. I think it could be of interest to many people with similar or identical set-ups.

What you have to do is type this lot:

```
*BUILD [
1 *BASIC
2 *LOAD USERDIC 8000
3 CLS:VDU7:P.'"Press
shfit...":REP
EATUNTILINKEY-1:CALL!-4
4 <ESCAPE>


*BUILD !BOOT
1 *BASIC
2 ENVELOPE1,1,0,0,0,0,0,0,-
126,-2-
0,-1,126,80
3 *FX211,1
4 *FX212,0
5 *FX213,180
6 *FX214,1
7 *IW.STARTER
8 <ESCAPE>


*BUILD ]
1 *BASIC
2 *SAVE USERDIC 8000 C000
3 VDU21
4 ?&FE4E=&7F:CALL!-4
5 <ESCAPE>


*OPT 4 3
```

Now make sure these three are all on the same disc, along with a USERDIC file for Spell Master, and an Inter-Word file (called STARTER) which contains no text but has options set to your own liking, for example 25 lines per screen, ink colour yellow, interlace off, 70 lines per page, heading and footing set, continuous spell check on and so on.

Now all you have to do at the beginning of a word-processing session is type:

```
>*EXEC [ <RETURN>
```

And the user dictionary will be loaded into sideways ram along with your standard STARTER file in Inter-Word, and the boring VDU7 bleep will be redefined as a ping – thank you Mathew Bennion, February 1990.

*Using *LOAD instead of Spell Master's own *DLOAD is much quicker – however this won't work on all systems and you have to press Break which is taken care of with CALL!-4 which is the same as Break. If you do not want to load the user dictionary, only the STARTER file, then just !BOOT the disc.*

At the end, just before shutting down, type from Inter-Word's main menu:

```
*EXEC ] <RETURN>
```

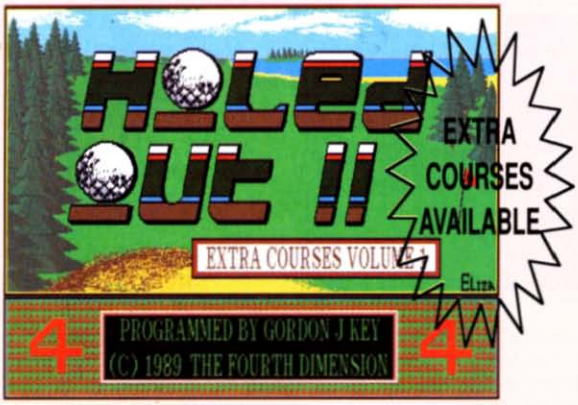
and USERDIC will be saved, and the computer will automatically do a Control+Break. By the way, I know CALL!-4 is break, and if you set ?&FE4E=&7F first, it does Control+Break, but does anyone know a command to do a Shift+Break? – **Tim Morley, Bolton, Lancs.**

ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested.

However, on the rare occasions when mistakes occur corrections are published as a matter of urgency. Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

Unfortunately we cannot answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the letters pages.

HOLED OUT!!



The original two contrasting 18 hole courses. Comes complete with an easy to follow 16 page manual.

Tape £10.95 *SAVE £2*
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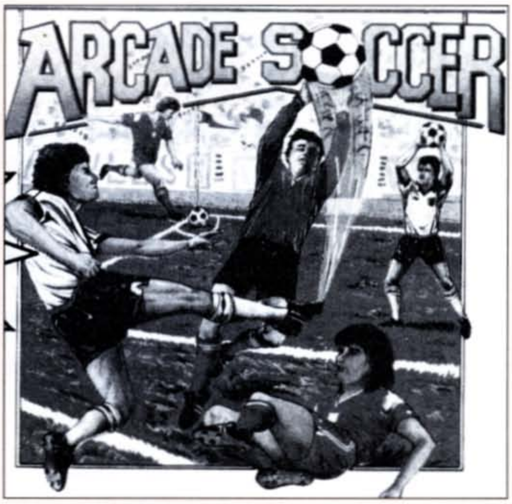
3.5" disc £13.95 *SAVE £2*

HOLED OUT EXTRA COURSES

Each of these two courses has been created to test your golfing abilities to the limits.

Tape £7.95 *SAVE £2*
5.25" disc £9.95 *SAVE £2*
3.5" disc £10.95 *SAVE £2*
All three save even more. See order form



Arcade Soccer really is football action at its very best

"The game is very playable and you do get a feeling of involvement as you knock the ball into the corner of the net straight past the diving goalie. It's definitely one to play again, and if you've enough friends it could make for a good day of enjoyment – and not a lot of games can do that. Value for money – 10 out of 10" – review of *The Micro User.*

Tape £7.95 *SAVE £2*
5.25" disc £10.95 *SAVE £2*
3.5" disc £11.95 *SAVE £2*

U.I.M
ULTRA-INTELLIGENT-MACHINE

U.I.M is a massive 3D arcade adventure set in the future

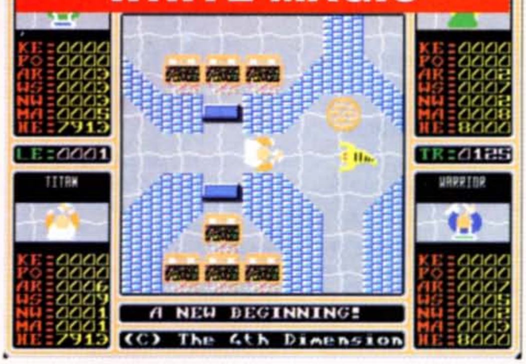
You must travel the oceans, trading in commodities, shares and currency. There are over 250 missions to complete before you will find your goal – the U.I.M. Your craft is a highly manoeuvrable (and expandable) futuristic submarine. The quest for the U.I.M. will be long and involved, the dangers intense, but the reward priceless!

"Will I keep playing it the way I've played Elite for years? And the answer is YES. Graphics 10, Playability 10, Value for money 10" – review in *The Micro User.*

U.I.M. is disc only and will run on BBC B or B+ with 16K of sideways RAM, BBC Master series.

5.25" disc £17.95 *SAVE £2*
Master Compact 3.5" disc £19.95 *SAVE £2*

WHITE MAGIC



WHITE MAGIC 1

White Magic is a arcade adventure in which you control four varied adventures. You can mix between all four characters at will and use their much needed special abilities. It features 32 massive action-packed levels.

A fast-action game which requires fierce hand-to-hand combat and frantic weapon fire.

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5.25" disc £10.95 *SAVE £2*
3.5" disc £11.95 *SAVE £2*

WHITE MAGIC 2

This includes 32 new and highly dangerous levels plus a complete level designer.

The level designer is easy to use. With it you can alter or design levels from scratch.

"The graphics are superb ...An absolute winner" – *Electron User Golden Game.*

Tape £7.95 *SAVE £2*
5.25" disc £10.95 *SAVE £2*
3.5" disc £11.95 *SAVE £2*

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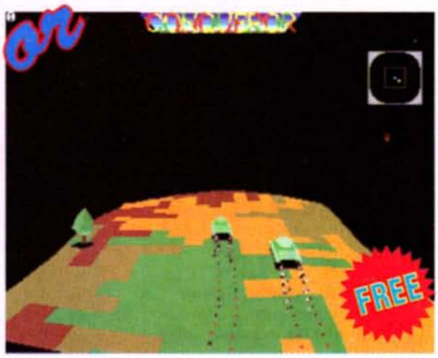
Subscribers with a BBC Micro, B+, Master, Compact or Electron will receive Exile. Now you can venture into the vast labyrinth of the most complex arcade adventure ever produced for an 8 bit micro

or



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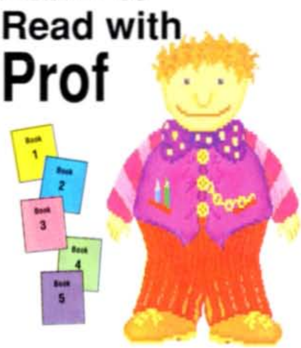

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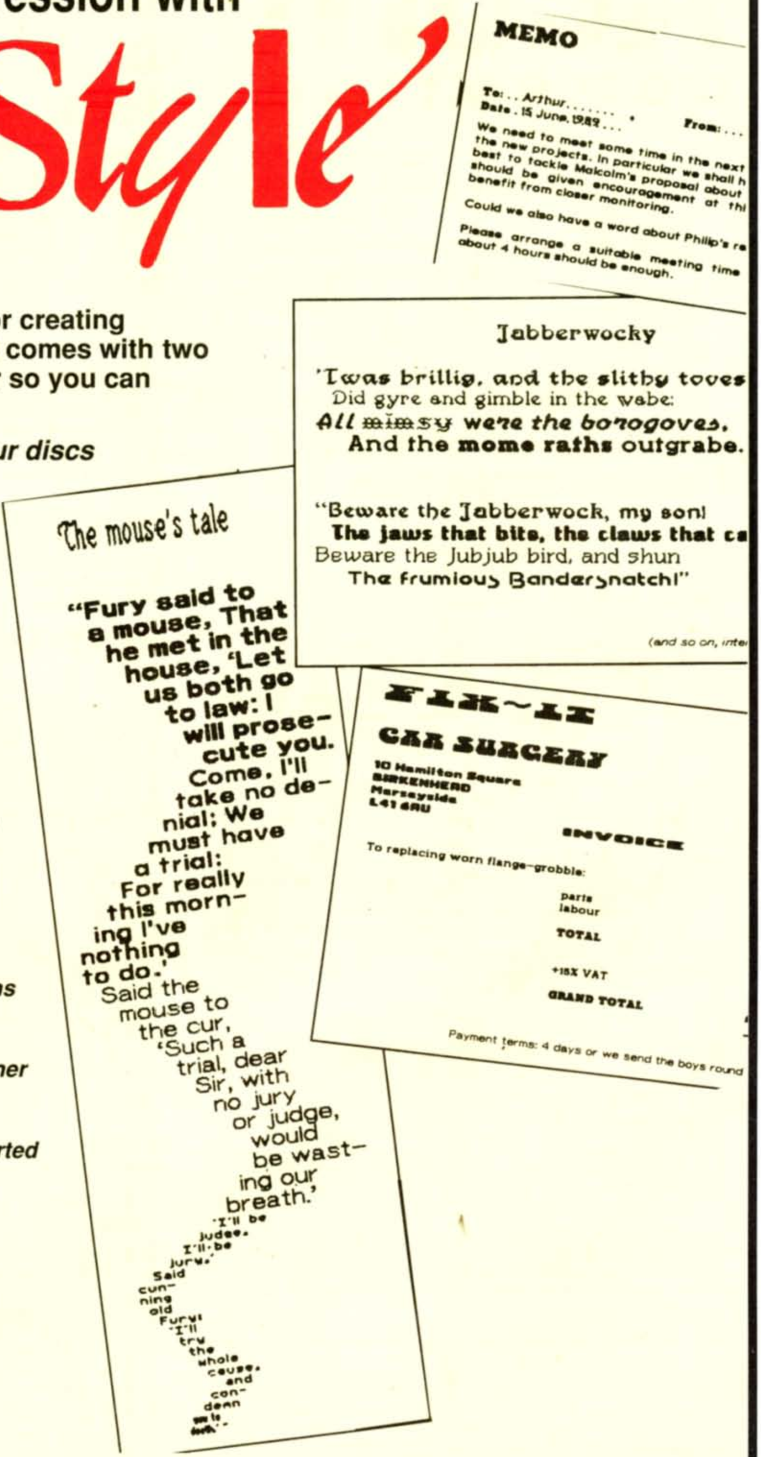

MEMO

To: . . Arthur. . . . .
Date . 15 June, 1989 . . . **From:** . . .

We need to meet some time in the next
the new projects. In particular we shall h
best to tackle Malcolm's proposal about
should be given encouragement at thi
benefit from closer monitoring.

Could we also have a word about Philip's re

Please arrange a suitable meeting time
about 4 hours should be enough.

Jabberwocky

'Twas brillig, and the slithy toves
Did gyre and gimble in the wabe:
All mimsy were the borogoves,
And the mome raths outgrabe.

"Beware the Jabberwock, my son!
The jaws that bite, the claws that c
Beware the Jubjub bird, and shun
The frumious Bandersnatch!"

(and so on, inte

The mouse's tale

"Fury said to
a mouse, That
he met in the
house, 'Let
us both go
to law: I
will prose-
cute you.
Come, I'll
take no de-
nial; We
must have
a trial:
For really
this morn-
ing I've
nothing
to do.'
Said the
mouse to
the cur,
'Such a
trial, dear
Sir, with
no jury
or judge,
would
be wast-
ing our
breath.'
'I'll be
judge,
I'll be
jury,'
Said
cun-
ning
old
Fury!
'I'll
try
the
whole
cause,
and
con-
demn
[illegible]

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(see page 124)

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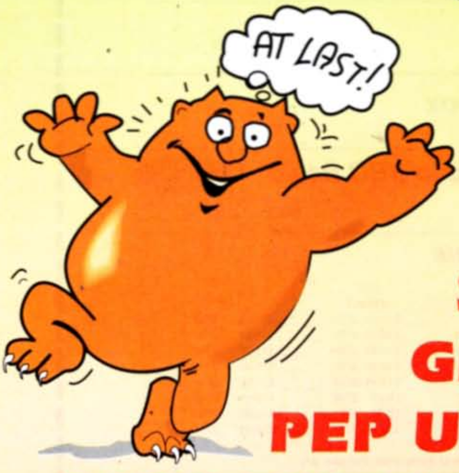

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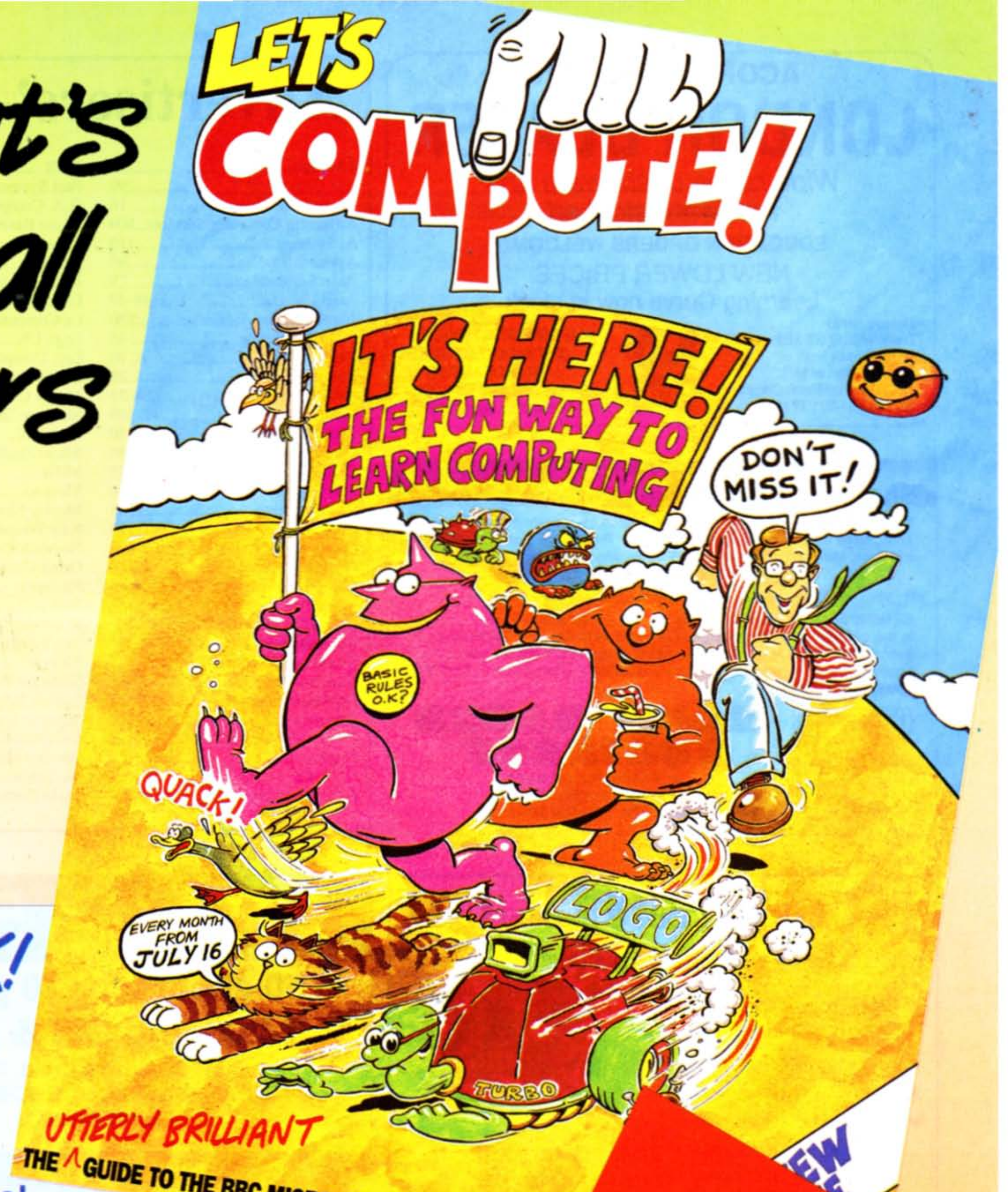
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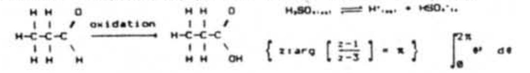

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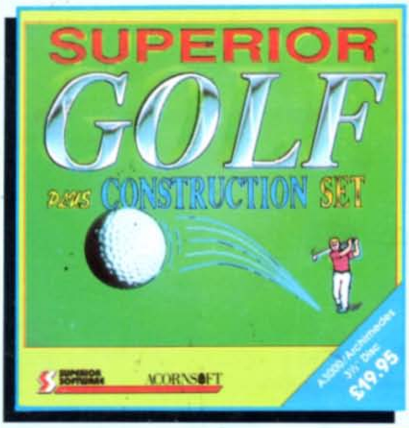

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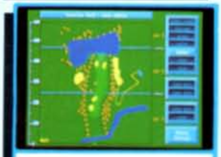

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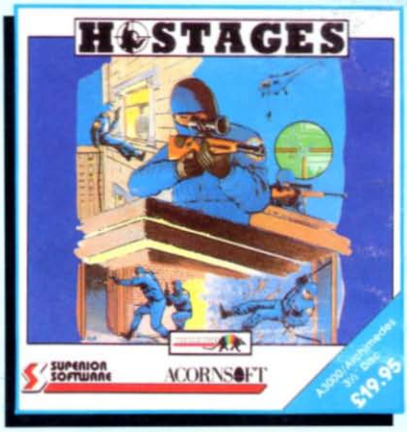

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